**ARCHITECTURE DEPARTMENT**

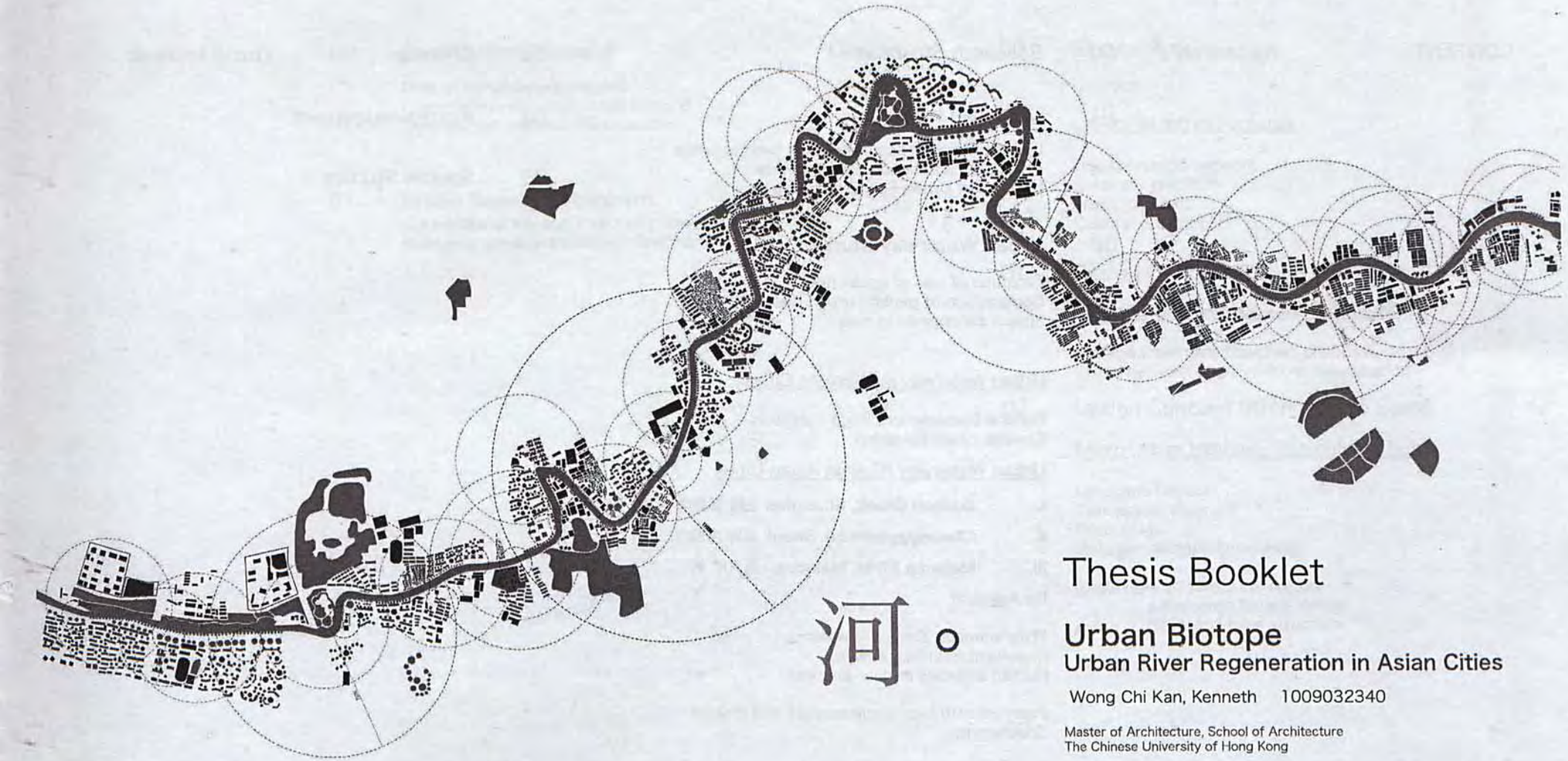
MASTER OF ARCHITECTURE PROGRAMME

**CHINESE UNIVERSITY OF HONG KONG**

2010-2011 DESIGN REPORT

# URBAN BIOTOPE – URBAN RIVER REGENERATION IN ASIAN CITIES

Wong Chi Kan, Kenneth May 2011



河 o

# Thesis Booklet

## Urban Biotope
### Urban River Regeneration in Asian Cities

Wong Chi Kan, Kenneth 1009032340

Master of Architecture, School of Architecture
The Chinese University of Hong Kong

CONTENT

**Research**

## Special Study

### 00 Constructed Wetland

Role of constructed wetland
Composition of constructed wetland
Constructed wetland construction

### 01 Urban Sewage Treatment

Conventional sewage treatment flowchart
Biological sewage treatment flowchart

## Design

### 00 Site Analysis

Location

<u>Layers of infrastructures</u>

Transportation network
Greenery precinct
Water precinct
Cultural precinct

### 01 Design Concept (Urban Scale)

<u>Macro urban biotope - Kai Tak River</u>

Sewage treatment flowchart proposal
Green network and riverfront rehabiltation

### 02 Design Concept (Architecture Scale)

<u>Micro urban biotope - Eco-cultural hub</u>

Lanscape Layout
Conceptual diagram
Floor plans
Unfolder sectoinal drawings

Sustainble architectural feature
parametric facade design
biological tube structure

Spatial quality

### 03 Reference

00 Research Structure

**Background**

**URBAN SCALE**

Urban phenonmenon Study

New Era of Urban Planning in Asia

**ARCHITECTURE SCALE**

Evolution of urban river Waterway composition

General riverfront interface
General Node condition

**HUMAN SCALE**

General Human Activities in waterway precinct

## Observation & Analysis

Programmatic Zoning Analysis

Riverfront interface analysis

Local Human Activities in waterway precinct

**Commentary**

**Critizism**

**Inspiration**

# 01 Urbanism

Urban phenonmenon in the past two centuries
Unique Urban phenonmenon in Asia
New Era of Urban Planning in Asia

# 01 Urbanism . Urban phenonmenon in the past two centuries

## Industrial Revolution and Modernization

Starting in the later part of the 18th century, thanks to the Industrial Revolution and Modernization in western countries, not only huge profit could be made and lots of urban renewal would be carried out but living environment was also sacrificed.

Many industrial buildings were built along the river or canal, and waterways like canal, river were adopted for transport use of raw materials and man factured goods, thus lots of waterway in urban context were polluted.

## Mass Migration

However, as compared with the Western Countries, most Asian cities are still being developed but in relatively high speed. Lots of people move from the rural to the city caused population expansion in urban area. Thus, the population density in city area rised rapidly with a large proportional change which cause a heavy burden to the urban habitable areas especially the lower class living area like slums (probably the early traditional settlement)

E.g. China's roads are set to get ever busier over the next 25 years. The country is set for the biggest mass migration in the history of the world, with 345 million people expected to move from rural areas to the coastal city belt by 2030. (BBC)

## Greenery Restoration

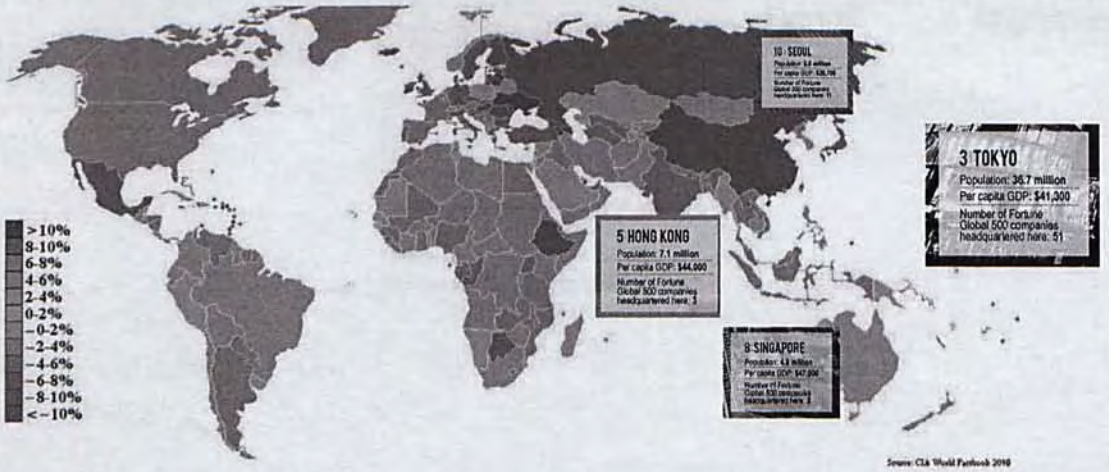
In mid 19 century, in order to improve the living environment in the city, a plenty of greenery was introduced to insert to or replace the urban area. The concept of city park was also aroused, for instance, Birkinhead Park in England, Central Park of New York in US etc. The city park which was promoted as an organ of the city refreshed the urban area acting like a lung and provided public open space for the citizens. Regarding the typical form of the city park enclosed by tons of buildings being too delicate, F.L. Olmsted introduced a new concept of city park cooperated with the natural landscape like forest, river, valley, tableland etc. e.g. Boston Park, Olympic sculpture park in Seattle.

## Infrastructure Sprawl

In order to facilitate the city development, lots of infrastructure especially the highway and elevated railway with lower building cost were built. At the same time, since the urban planner believed that those infrastructures have to be accomplished in the shortest time and thus the city development could be executed even faster.

Unfortunately, most of the planning were not indeed well organized, mass destruction of traditional early settlement and greenery were carried out. Then, the huge infrastructure made the surrounding living environment worse and too much construction polluted many urban areas.

# 01 Urbanism . Unique Urban phenonmenon in Asia




The World's New Top Ten Cities 2010
http://www.foreignpolicy.com

01 New York 02 London 03 Tokyo 04 Paris 05 Hong Kong 06 Chicago 07 Los Angeles 08 Singapore 09 Sydney 10 Seoul

**Unique urban phenomenon in Asian cities**
Immoderate urban sprawl

After opening treaty ports, most Asian countries experienced a rapid increase in urban populations and large-scale expansion of urban space. Generally, industrialization deeply related to the urbanization process due to a huge amount of industrial facilities set up around city for more job opportunity and rural population absorption. This rapid growth of urban population led the urban space to be expended and its functions to be complicated, and thus the advancement of urban structure was launched.

Concerning the recent trends in the global economy, there is no doubt about that Asia is going to be a powerful engine of it

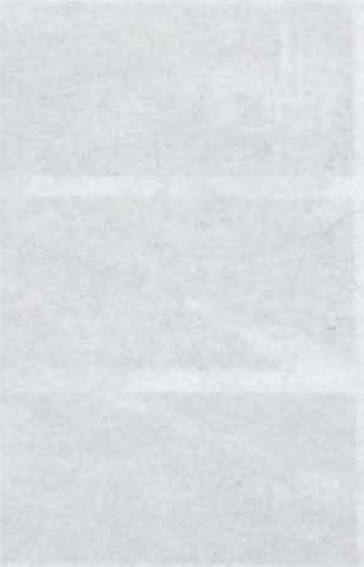
notwithstanding the explosion of the "Lehman Shock" in 2008. According to the official issuance, the amount of construction industry output in Asia has already exceeded 1.4 trillion USD, equivalent to 30% of the global amount in 2007. The pace of urban growth has been going to be uncontrolled and still speeded up as a sprawl particularly in China.

During the urban development in Asia, the modern city planning standards from the West was imported to the Asian countries and executed in different way according to their specific humanistic, geographical and urban condition. Regarding the Asian Industrialization triggered 50 year later as compared with the Western, unlike the clear contrast between high dense city centre and horizontally expanded suburbs in American big cities, Asian cities, after the WWII, displayed a dense cityscape in which high rise buildings and apartments are irregularly amalgamated and a singularity has thus been formulated.

**Side effects from the paradigm shift of uncontrolled urban sprawl**

Natural resource
In the cause of the economy boom and a natural eagerness towards the enhancement of living quality, the energy and resource consumption were promptly increased in both developed and developing Asian countries, which is a usual phenomenon in every society, for instance, the major western countries also reveal that since the industrial revolution.

Living environment
Air pollution, degraded cityscape, high-rise & high-dense development and traffic Congestion.



James Corner
Landscape Architect and theorist

## Urbanism, Landscape & Architecture complement each other

Landscape urbanism or Ecological Urbanism would be an approach which regards the landscape as an infrastructural agent to shape urban structures rather than as a fixed element: it "marks a productive attitude towards indeterminacy, open-endedness, intermixing and cross-disciplinarily. (James Corner, 2003)

New vision in Architecture and Landscape

In the past, architecture would be literally configured or recognized as a single individual object, and the landscape which seems to be a subsidiary embellishment in a urban development project. Nowadays, landscape is regarded as a kind of infrastructure or a new medium to organize the urban renewal, and there would be no clear segregation or absolute boundary between architecture and landscape. Each of them would be re-configured to complement each other. And this phenomenon would be even hastened by the cultural demands and ecological concerns.

**PAST**

A clear main structure and the substructure linked to the specific programms formed the city

**NOW**

A multi-layering urban pattern formed by a collection of urbanization projects which are regarded as leaves just like a piece of the mosaic and overlapped with each other.

A group of homogeneous program linked to a main structure

Clusters of heterogeneous programslinked to a main structure

A building complex with mix-use program as a branch of city fibre

## Transformation in Asia Urban Planning

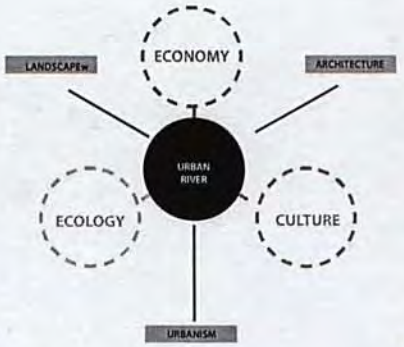
De-Hierarchized Urban Fabric

As the city reaches the maximum limit for city exansion, the possible strategy :

Re-construction
Re-qualification
Re-configuration

During the city expansion or urban renewal, the urban fabric would be distributed according to various urbanization projects. It means the conventional hierarchy dissolved, and a different form of structure was built according to new reasons for existence. In the past, a clear main structure and the substructure linked to the specific programmes formed the city could be observed. For the current Asian modern urban environment, we could find out A multi-layering urban pattern formed by a collection of urbanization projects which are regarded as leaves just like a piece of the mosaic and overlapped with each other.

Recognition of the importance of landscapes as infrastructure opens a new charpeter in urban development. As one architect once asserted, the city sould not deal with what to build, but with what not to build. This emphasis on the Reevaluatin, Restructuring, networking and designing of urban void spaces is accelerated by **cultural demands** and **ecological concerns.**




## Implication Urban Planning in Asia

Drastic therapy
Re-configuration of public space

Drastic therapy

Concerning all the changes from the rapid city transformation, a drastic reconstruction of urban structure rather than a piece of local amendments should be required. It means we should consider the re-development such as a new infrastructure in the city, which could stimulate the adjacent districts to transform and gradually fit into the new cityscape due to the speedy city development since the Asian industrialization.

Re-configuration of public space

In order to solve the side effect of the paradigm shift, urban public space and greenery would be an essential element for the efficient city therapy since it could potentially subtract the building density, reduce the heat island effect and improve the living environment, but it's necessary to reconfigure it to work with the city current infrastructure like road network. Besides, the urban public space should be associated and compromised with the nature like the greenery, river, forest etc. instead of man-made urban artifacts since working with the nature could be a right way for a sustainable city development.

Moreover, the urban public space would be designed not only for leisure use, but also provide a place for any cultural events. Based on the local traditions, culture or history background, the public urban space or open space would be re-organized to house my cultural activities like weekend market, public forum, artworks exhibition etc. and encourage the usage of public space and interaction between different societies.

Furthermore, urban river provide a proper scenario to illustrate this new approach of pubic urban space design since its innate linear form and a sense of natural movement could easily provide a framework for the public space network, provide more diverse natural environment for citizens and inject energy to the city.

And how to using urban river as a tool to re-configure the urban public spaces to stimulate a sustainable urban renewal would be one of objectives of this thesis.

# 02 Urban Waterway

Evolution
Composition

## Urban waterway in Western Cities

General Embankment Edge condition
General  Node condition

Urban Waterway River In Asian Cities

**Suzhou Creek, Shanghai**
上海 蘇州河

Background

Programmatic Zoning Analysis
Riverfront interface anaylsis
Human activities in river precinct

Interviews with professionals and the local
Commentary

**Cheonggyecheon, Seoul**
首爾 清溪川

Background

Programmatic Zoning Analysis
Riverfront interface anaylsis
Human activities in river precinct

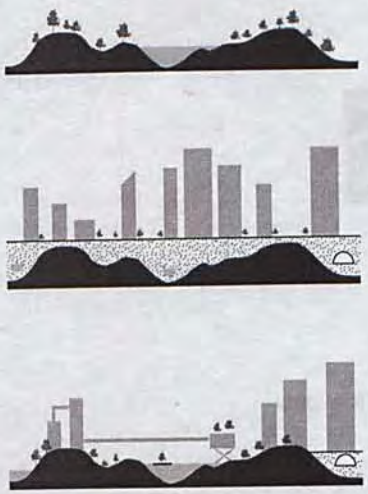
Interviews with professionals and the local
Commentary

**Malacca River, Malacca**
馬六甲河

Background

Programmatic Zoning Analysis
Riverfront interface anaylsis
Human activities in river precinct

Interviews with professionals and the local
Commentary



## Role of River has been changed in Environment & city development

In the ancient time, people would naturally inhabit along the river because water source would be essential for agriculture and the flowing water could facilitate the sewage discharge. In some countries, rivers would be regarded as an origin of a city, as it could show the historical development of a city or country. Besides, rivers are also a sacred

Since industrialization, rivers became a network for transport and activate the inter-regional trading. Lots of warehouses were built and occupied along the river without any public access, and extra artificial waterway like canal was constructed continuously in order to the expand the transport network and drainage system due to the rapid city development.

Especially in Asia, due to the unreasonable prompt city development, a huge amount of infrastructure like elevated highway, underground highway, subway system and road network upgrade was built and sprawled. Elevated highway would be the most common approach to upgrade the road network as it could be finished within the shortest time and cost less on construction as compared with other underground proposal. Indeed, some rivers or exposed canal were totally covered as new highways built above. However, those sprawl highway networks would worsen the

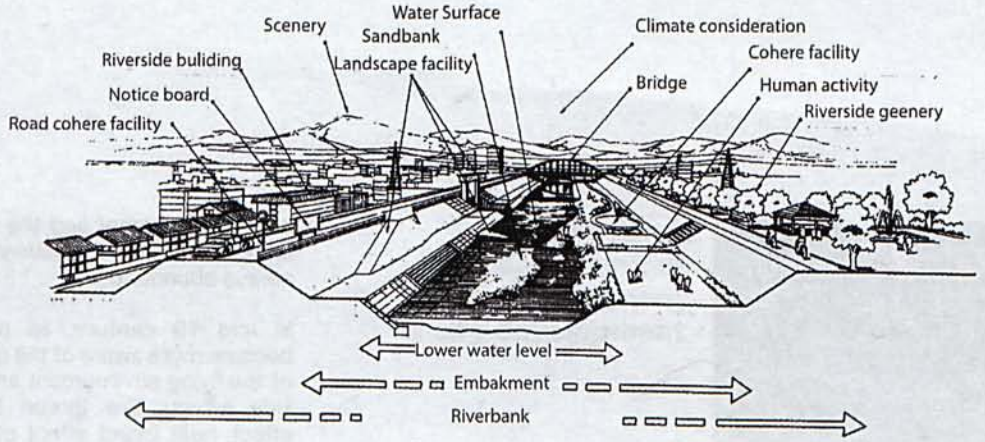
Blue Road-eo in Holland
created by Artist Henk Hofstra

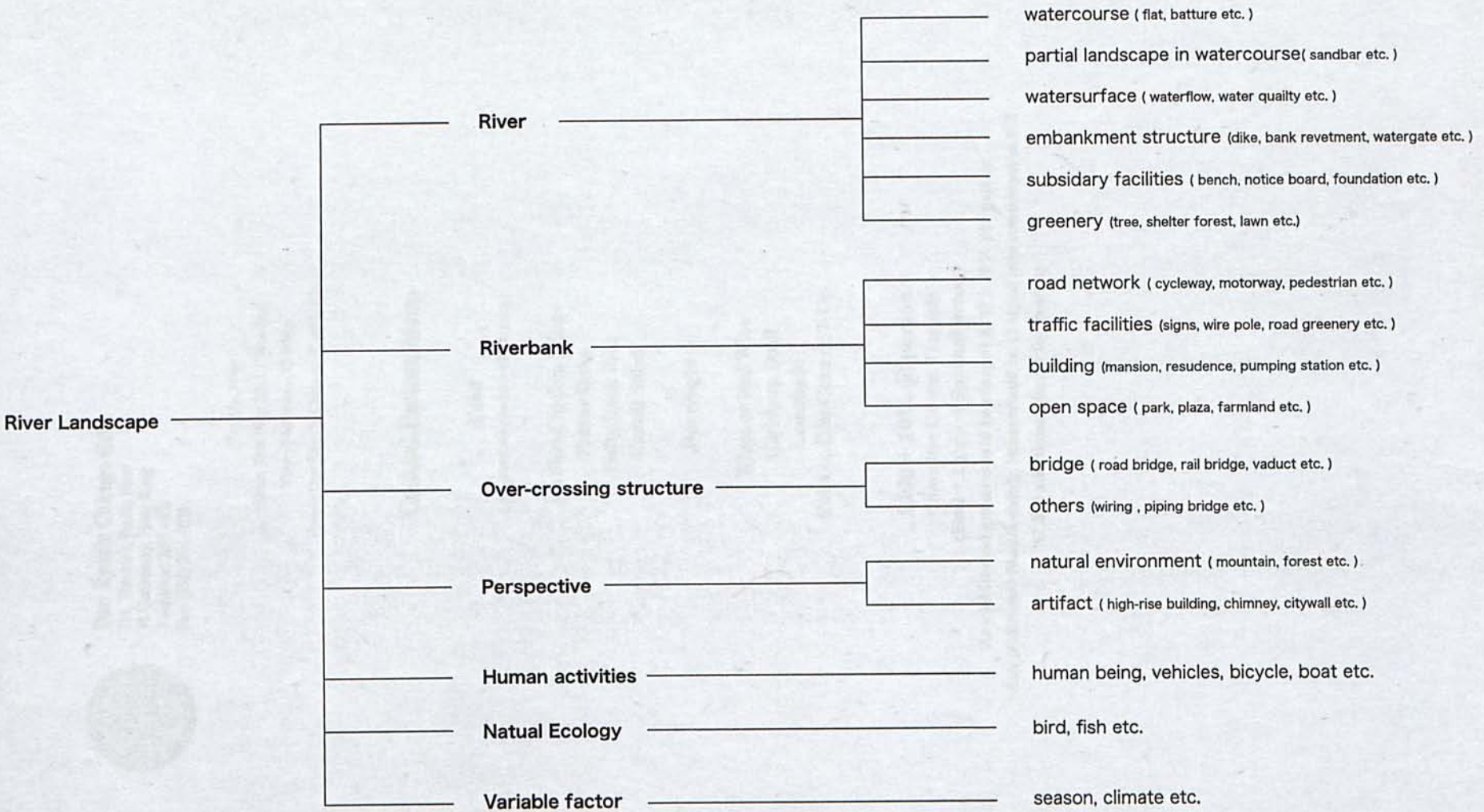
'Cool Water, Hot Island'
rendering by Artist Molly Dilworth

living environment and the areas underneath the highway are always abundant.

In mid 19 century, as people become more aware of the quality of the living environment and the side effects like (green house effect, heat island effect etc.) of the over-development, a plenty of greenery was introduced to insert to or replace the urban area. After the concept of city park was aroused, F.L. Olmsted advocated the concept of natural landscape working with city park like Boston Park. This kind of approach also motivate the renewal of urban waterway like the abundant canal etc.

Until the completion of Cheonggyecheon in Seoul, the professionals ensure the success of the urban river renewal and many similar scale waterway renewal are going to be carried out in Asia. Although the Korean one cannot really solve all the urban issue in the river precinct, it really causes a positive effect to the city image, improve the heat island effect in the city and establish a stepping stone for the urban waterway regeneration.


Water Surface
Scenery
Sandbank
Climate consideration
Cohere facility
Riverside buliding
Landscape facility
Bridge
Human activity
Notice board
Riverside geenery
Road cohere facility
Lower water level
Embakment
Riverbank


River Landscape
River
watercourse ( flat, batture etc. )
partial landscape in watercourse( sandbar etc. )
watersurface ( waterflow, water quailty etc. )
embankment structure (dike, bank revetment, watergate etc. )
subsidary facilities ( bench, notice board, foundation etc. )
greenery (tree, shelter forest, lawn etc.)
Riverbank
road network ( cycleway, motorway, pedestrian etc. )
traffic facilities (signs, wire pole, road greenery etc. )
building (mansion, resudence, pumping station etc. )
open space ( park, plaza, farmland etc. )
Over-crossing structure
bridge ( road bridge, rail bridge, vaduct etc. )
others (wiring , piping bridge etc. )
Perspective
natural environment ( mountain, forest etc. )
artifact ( high-rise building, chimney, citywall etc. )
Human activities
human being, vehicles, bicycle, boat etc.
Natual Ecology
bird, fish etc.
Variable factor
season, climate etc.

**Dan Ryan's Chicago Grill**
114, The Mall, Pacific Place
88 Queensway, Hong Kong
Telephone: 2845-4600
Fax: (852) 2521-8055

To: Ms. Mak
Date: 21st May 2011 (Saturday)
Time: 10:00pm – 12:00am
Venue: Dan Ryan's Chicago (Pacific Place)

## Cocktail Package Menu

### Food

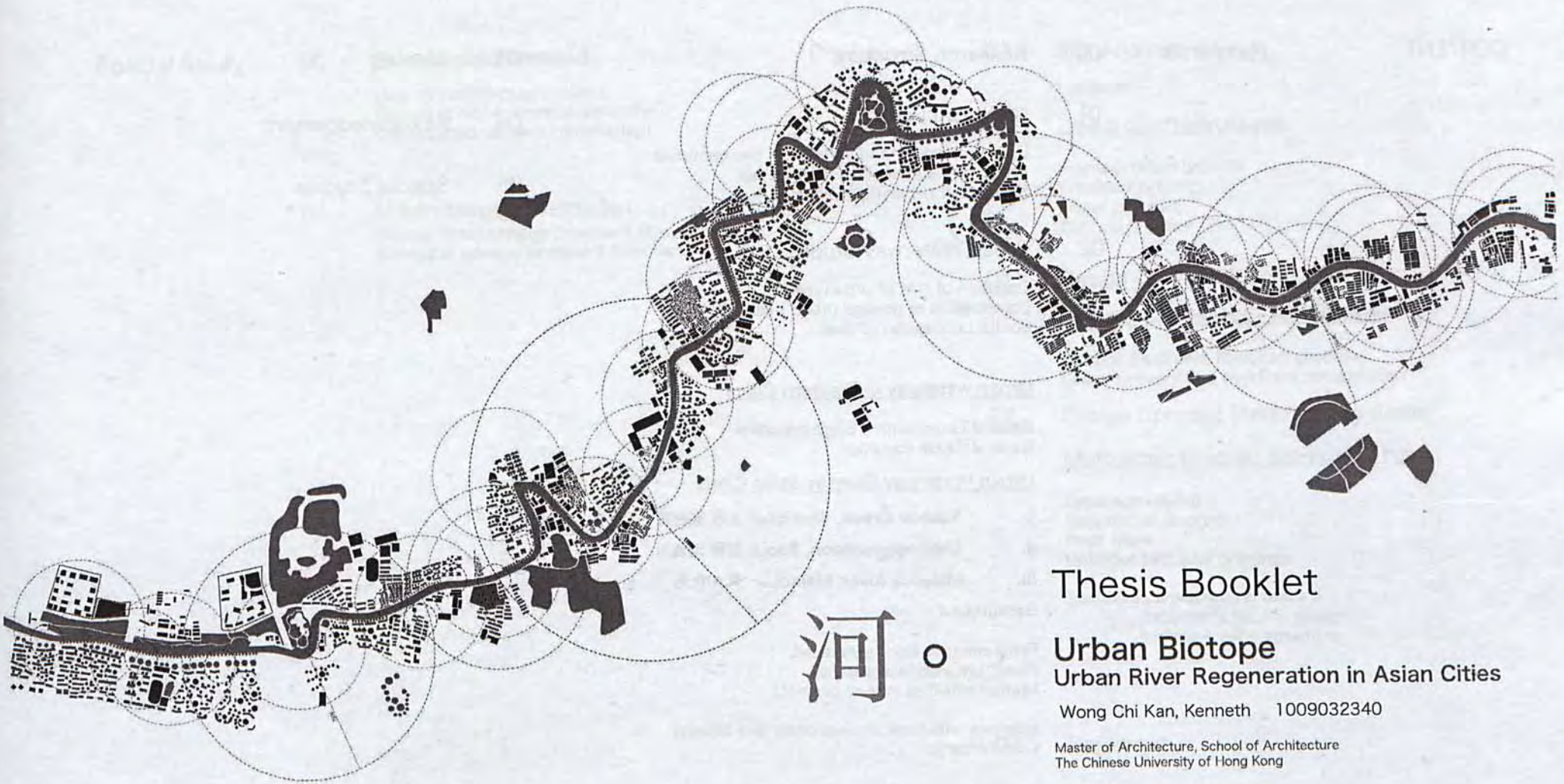
(All items are conducive of sharing)

Buffalo Chicken Wings
Potato Skins
Baby Back Ribs
Caesar Salad

### Beverages

White or Red Wine
Carlsberg Draft
Lemonade
Coke or Diet Coke or 7-Up

**$200 + 10% @ person**
**Guarantee Covers: 27 people**
**(Food + 1 glass of Standard Drinks)**
**Any additional guests would be charged $200 + 10% per person**
**Any additional food & drinks items would be charged into consumption bill**
**$1,500 additional charge for gratuity**



河 o

# Thesis Booklet

## Urban Biotope
### Urban River Regeneration in Asian Cities

Wong Chi Kan, Kenneth 1009032340

Master of Architecture, School of Architecture
The Chinese University of Hong Kong

CONTENT

Research

## Special Study

00 Constructed Wetland

Role of constructed wetland
Composition of constructed wetland
Constructed wetland construction

01 Urban Sewage Treatment

Conventional sewage treatment flowchart
Biological sewage treatment flowchart

## Design

00 Site Analysis

Location

Layers of infrastructures

Transportation network
Greenery precinct
Water precinct
Cultural precinct

01 Design Concept (Urban Scale)

Macro urban biotope - Kai Tak River

Sewage treatment flowchart proposal
Green network and riverfront rehabiltation

02 Design Concept (Architecture Scale)

Micro urban biotope - Eco-cultural hub

Lanscape Layout
Conceptual diagram
Floor plans
Unfolder sectoinal drawings

Sustainble architectural feature
parametric facade design
biological tube structure

Spatial quality

03 Reference

00 Research Structure

**Background**

**URBAN SCALE**

Urban phenonmenon
Study

New Era of Urban
Planning in Asia

**ARCHITECTURE SCALE**

Evolution of urban river
Waterway composition

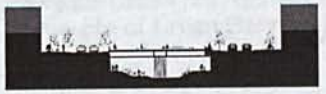
General riverfront interface
General Node condition

**HUMAN SCALE**

General Human Activities in
waterway precinct

## Observation & Analysis

Programmatic Zoning Analysis



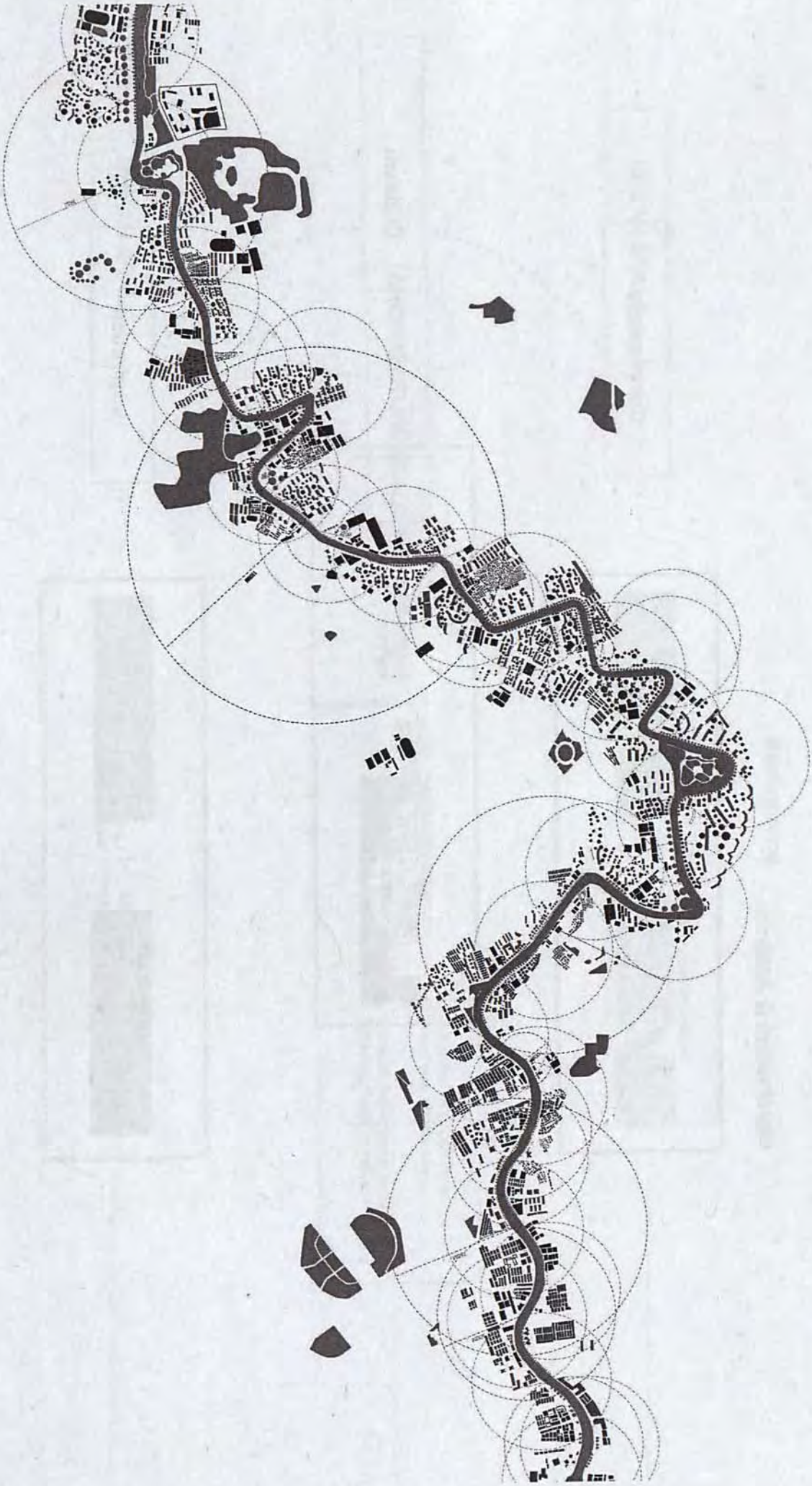
Riverfront interface analysis

Local Human Activities in waterway precinct

**Commentary**

**Critizism**

**Inspiration**



# 01 Urbanism

Urban phenonmenon in the past two centuries
Unique Urban phenonmenon in Asia
New Era of Urban Planning in Asia

# 01 Urbanism . Urban phenonmenon in the past two centuries

## Industrial Revolution and Modernization

Starting in the later part of the 18th century, thanks to the Industrial Revolution and Modernization in western countries, not only huge profit could be made and lots of urban renewal would be carried out but living environment was also sacrificed.

Many industrial buildings were built along the river or canal, and waterways like canal, river were adopted for transport use of raw materials and man factured goods, thus lots of waterway in urban context were polluted.

## Mass Migration

However, as compared with the Western Countries, most Asian cities are still being developed but in relatively high speed. Lots of people move from the rural to the city caused population expansion in urban area. Thus, the population density in city area rised rapidly with a large proportional change which cause a heavy burden to the urban habitable areas especially the lower class living area like slums (probably the early traditional settlement)

E.g. China's roads are set to get ever busier over the next 25 years. The country is set for the biggest mass migration in the history of the world, with 345 million people expected to move from rural areas to the coastal city belt by 2030. (BBC)

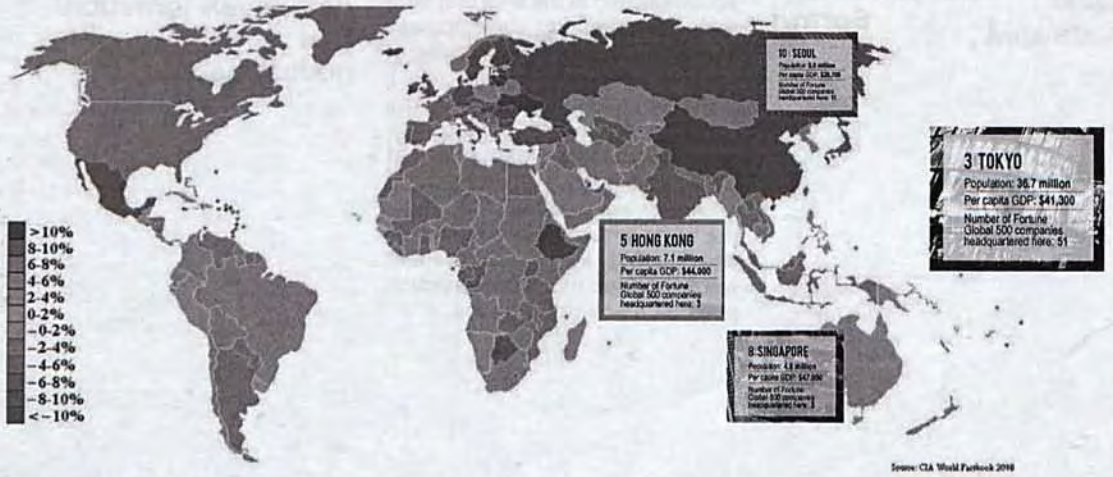
## Greenery Restoration

In mid 19 century, in order to improve the living environment in the city, a plenty of greenery was introduced to insert to or replace the urban area. The concept of city park was also aroused, for instance, Birkinhead Park in England, Central Park of New York in US etc. The city park which was promoted as an organ of the city refreshed the urban area acting like a lung and provided public open space for the citizens. Regarding the typical form of the city park enclosed by tons of buildings being too delicate, F.L. Olmsted introduced a new concept of city park cooperated with the natural landscape like forest, river, valley, tableland etc. e.g. Boston Park, Olympic sculpture park in Seattle.

## Infrastructure Sprawl

In order to facilitate the city development, lots of infrastructure especially the highway and elevated railway with lower building cost were built. At the same time, since the urban planner believed that those infrastructures have to be accomplished in the shortest time and thus the city development could be executed even faster.

Unfortunately, most of the planning were not indeed well organized, mass destruction of traditional early settlement and greenery were carried out. Then, the huge infrastructure made the surrounding living environment worse and too much construction polluted many urban areas.




The World's New Top Ten Cities 2010
http://www.foreignpolicy.com

| | | | | | |
|---|---|---|---|---|---|
| 01 New York | 04 Paris | 07 Los Angeles | 10 Seoul | | |
| 02 London | 05 Hong Kong | 08 Singapore | | | |
| 03 Tokyo | 06 Chicago | 09 Sydney | | | |

**Unique urban phenomenon in Asian cities**
Immoderate urban sprawl

After opening treaty ports, most Asian countries experienced a rapid increase in urban populations and large-scale expansion of urban space. Generally, industrialization deeply related to the urbanization process due to a huge amount of industrial facilities set up around city for more job opportunity and rural population absorption. This rapid growth of urban population led the urban space to be expended and its functions to be complicated, and thus the advancement of urban structure was launched.

Concerning the recent trends in the global economy, there is no doubt about that Asia is going to be a powerful engine of it

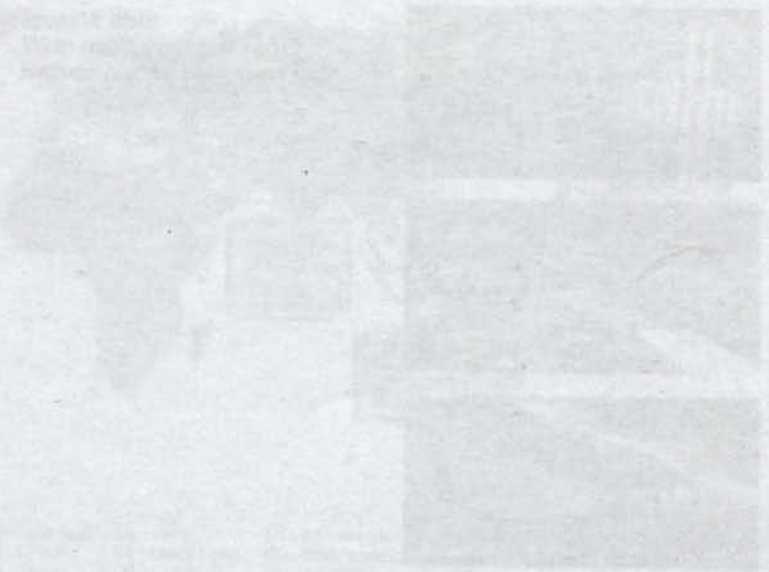
notwithstanding the explosion of the "Lehman Shock" in 2008. According to the official issuance, the amount of construction industry output in Asia has already exceeded 1.4 trillion USD, equivalent to 30% of the global amount in 2007. The pace of urban growth has been going to be uncontrolled and still speeded up as a sprawl particularly in China.

During the urban development in Asia, the modern city planning standards from the West was imported to the Asian countries and executed in different way according to their specific humanistic, geographical and urban condition. Regarding the Asian Industrialization triggered 50 year later as compared with the Western, unlike the clear contrast between high dense city centre and horizontally expanded suburbs in American big cities, Asian cities, after the WWII, displayed a dense cityscape in which high rise buildings and apartments are irregularly amalgamated and a singularity has thus been formulated.

**Side effects from the paradigm shift of uncontrolled urban sprawl**

Natural resource
In the cause of the economy boom and a natural eagerness towards the enhancement of living quality, the energy and resource consumption were promptly increased in both developed and developing Asian countries, which is a usual phenomenon in every society, for instance, the major western countries also reveal that since the industrial revolution.

Living environment
Air pollution, degraded cityscape, high-rise & high-dense development and traffic Congestion.



James Corner
Landscape Architect and theorist

## Urbanism, Landscape & Architecture complement each other

Landscape urbanism or Ecological Urbanism would be an approach which regards the landscape as an infrastructural agent to shape urban structures rather than as a fixed element: it "marks a productive attitude towards indeterminacy, open-endednesss, intermixing and cross-disciplinarily. (James Corner, 2003)

New vision in Architecture and Landscape

In the past, architecture would be literally configured or recognized as a single individual object, and the landscape which seems to be a subsidiary embellishment in a urban development project. Nowadays, landscape is regarded as a kind of infrastructure or a new medium to organize the urban renewal, and there would be no clear segregation or absolute boundary between architecture and landscape. Each of them would be re-configured to complement each other. And this phenomenon would be even hastened by the cultural demands and ecological concerns.

PAST

A clear main structure and the substructure linked to the specific programms formed the city

NOW

A multi-layering urban pattern formed by a collection of urbanization projects which are regarded as leaves just like a piece of the mosaic and overlapped with each other.

A group of homogeneous program linked to a main structure

Clusters of heterogeneous programslinked to a main structure

A building complex with mix-use program as a branch of city fibre

## Transformation in Asia Urban Planning

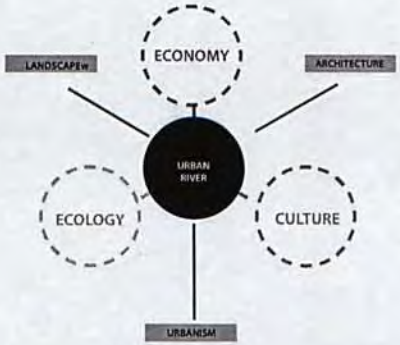
De-Hierarchized Urban Fabric

As the city reaches the maximum limit for city exansion, the possible strategy :

Re-construction
Re-qualification
Re-configuration

During the city expansion or urban renewal, the urban fabric would be distributed according to various urbanization projects. It means the conventional hierarchy dissolved, and a different form of structure was built according to new reasons for existence. In the past, a clear main structure and the substructure linked to the specific programmes formed the city could be observed. For the current Asian modern urban environment, we could find out A multi-layering urban pattern formed by a collection of urbanization projects which are regarded as leaves just like a piece of the mosaic and overlapped with each other.

Recognition of the importance of landscapes as infrastructure opens a new charpeter in urban development. As one architect once asserted, the city sould not deal with what to build, but with what not to build. This emphasis on the Reevaluatin, Restructuring, networking and designing of urban void spaces is accelerated by **cultural demands** and **ecological concerns.**




## Implication Urban Planning in Asia

Drastic therapy
Re-configuration of public space

Drastic therapy

Concerning all the changes from the rapid city transformation, a drastic reconstruction of urban structure rather than a piece of local amendments should be required. It means we should consider the re-development such as a new infrastructure in the city, which could stimulate the adjacent districts to transform and gradually fit into the new cityscape due to the speedy city development since the Asian industrialization.

Re-configuration of public space

In order to solve the side effect of the paradigm shift, urban public space and greenery would be an essential element for the efficient city therapy since it could potentially subtract the building density, reduce the heat island effect and improve the living environment, but it's necessary to reconfigure it to work with the city current infrastructure like road network. Besides, the urban public space should be associated and compromised with the nature like the greenery, river, forest etc. instead of man-made urban artifacts since working with the nature could be a right way for a sustainable city development.

Moreover, the urban public space would be designed not only for leisure use, but also provide a place for any cultural events. Based on the local traditions, culture or history background, the public urban space or open space would be re-organized to house my cultural activities like weekend market, public forum, artworks exhibition etc. and encourage the usage of public space and interaction between different societies.

Furthermore, urban river provide a proper scenario to illustrate this new approach of pubic urban space design since its innate linear form and a sense of natural movement could easily provide a framework for the public space network, provide more diverse natural environment for citizens and inject energy to the city.

And how to using urban river as a tool to re-configure the urban public spaces to stimulate a sustainable urban renewal would be one of objectives of this thesis.

## 02 Urban Waterway

Evolution
Composition

## Urban waterway in Western Cities

General Embankment Edge condition
General  Node condition

Urban Waterway River In Asian Cities

**Suzhou Creek, Shanghai**
上海 蘇州河

Background

Programmatic Zoning Analysis
Riverfront interface anaylsis
Human activities in river precinct

Interviews with professionals and the local
Commentary

**Cheonggyecheon, Seoul**
首爾 清溪川

Background

Programmatic Zoning Analysis
Riverfront interface anaylsis
Human activities in river precinct

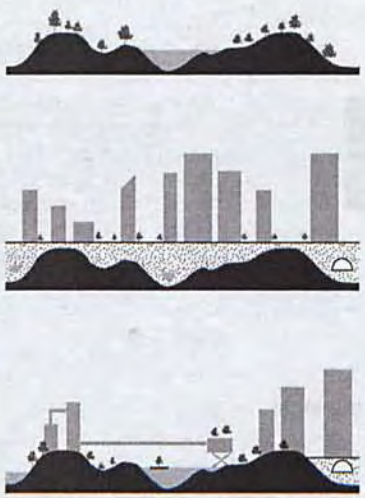
Interviews with professionals and the local
Commentary

**Malacca River, Malacca**
馬六甲河

Background

Programmatic Zoning Analysis
Riverfront interface anaylsis
Human activities in river precinct

Interviews with professionals and the local
Commentary



## Role of River has been changed in Environment & city development

In the ancient time, people would naturally inhabit along the river because water source would be essential for agriculture and the flowing water could facilitate the sewage discharge. In some countries, rivers would be regarded as an origin of a city, as it could show the historical development of a city or country. Besides, rivers are also a sacred

Since industrialization, rivers became a network for transport and activate the inter-regional trading. Lots of warehouses were built and occupied along the river without any public access, and extra artificial waterway like canal was constructed continuously in order to the expand the transport network and drainage system due to the rapid city development.

Especially in Asia, due to the unreasonable prompt city development, a huge amount of infrastructure like elevated highway, underground highway, subway system and road network upgrade was built and sprawled. Elevated highway would be the most common approach to upgrade the road network as it could be finished within the shortest time and cost less on construction as compared with other underground proposal. Indeed, some rivers or exposed canal were totally covered as new highways built above. However, those sprawl highway networks would worsen the

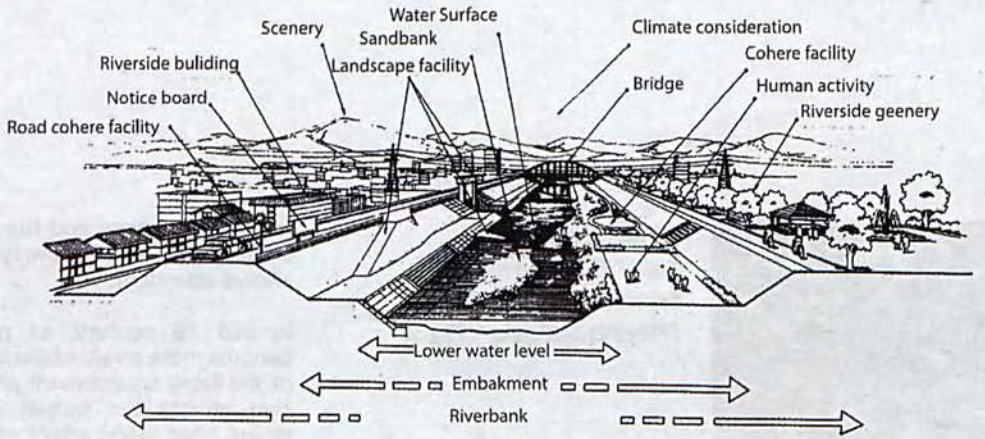
Blue Road-eo in Holland
created by Artist Henk Hofstra

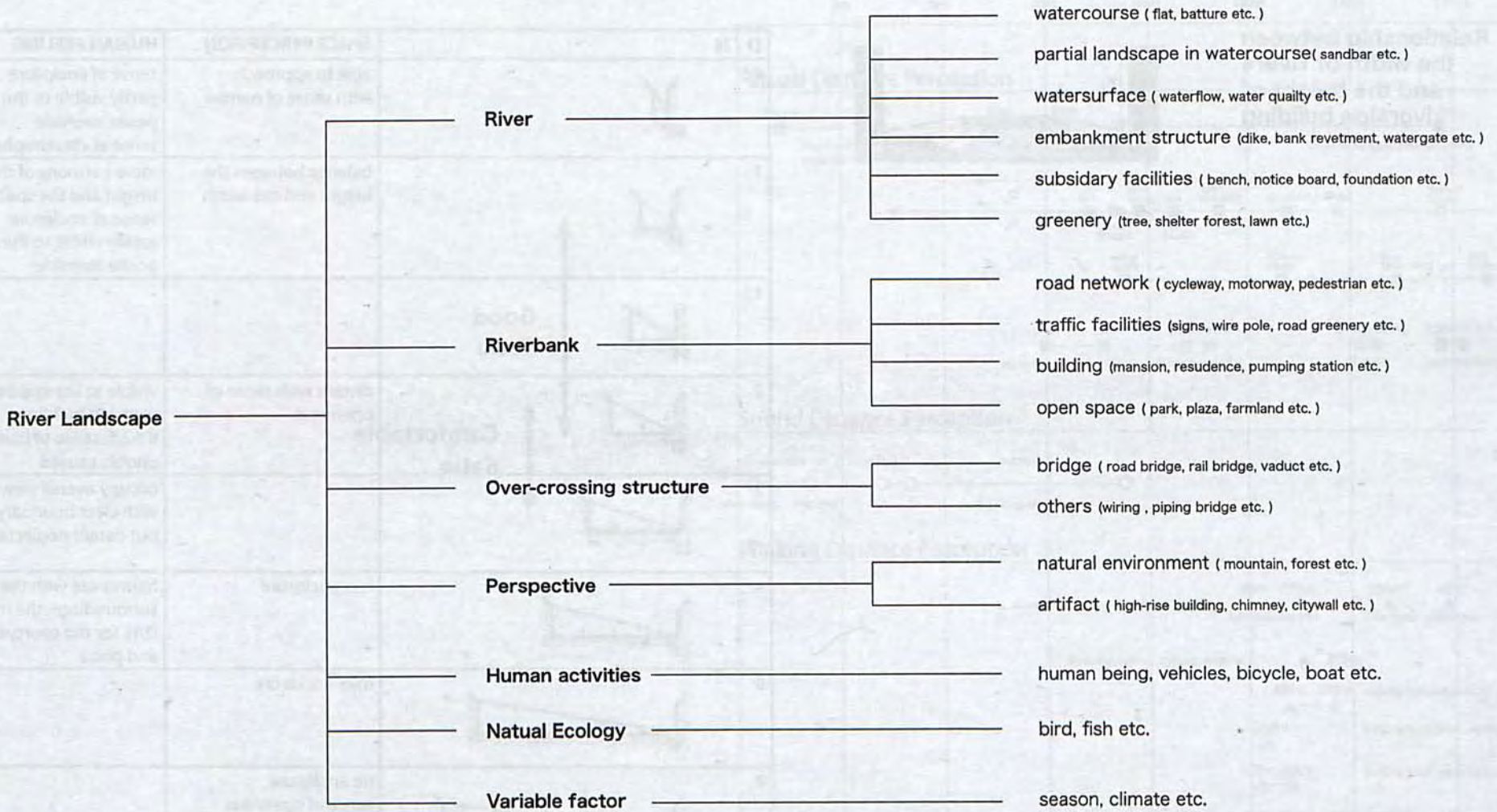
'Cool Water, Hot Island'
rendering by Artist Molly Dilworth

living environment and the areas underneath the highway are always abundant.

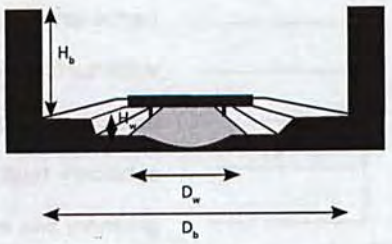
In mid 19 century, as people become more aware of the quality of the living environment and the side effects like (green house effect, heat island effect etc.) of the over-development, a plenty of greenery was introduced to insert to or replace the urban area. After the concept of city park was aroused, F.L. Olmsted advocated the concept of natural landscape working with city park like Boston Park. This kind of approach also motivate the renewal of urban waterway like the abundant canal etc.

Until the completion of Cheonggyecheon in Seoul, the professionals ensure the success of the urban river renewal and many similar scale waterway renewal are going to be carried out in Asia. Although the Korean one cannot really solve all the urban issue in the river precinct, it really causes a positive effect to the city image, improve the heat island effect in the city and establish a stepping stone for the urban waterway regeneration.


Water Surface
Scenery
Sandbank
Climate consideration
Cohere facility
Riverside buliding
Landscape facility
Bridge
Human activity
Notice board
Riverside geenery
Road cohere facility
Lower water level
Embakment
Riverbank


River Landscape
River
watercourse ( flat, batture etc. )
partial landscape in watercourse( sandbar etc. )
watersurface ( waterflow, water quailty etc. )
embankment structure (dike, bank revetment, watergate etc. )
subsidary facilities ( bench, notice board, foundation etc. )
greenery (tree, shelter forest, lawn etc.)
Riverbank
road network ( cycleway, motorway, pedestrian etc. )
traffic facilities (signs, wire pole, road greenery etc. )
building (mansion, resudence, pumping station etc. )
open space ( park, plaza, farmland etc. )
Over-crossing structure
bridge ( road bridge, rail bridge, vaduct etc. )
others (wiring , piping bridge etc. )
Perspective
natural environment ( mountain, forest etc. )
artifact ( high-rise building, chimney, citywall etc. )
Human activities
human being, vehicles, bicycle, boat etc.
Natual Ecology
bird, fish etc.
Variable factor
season, climate etc.

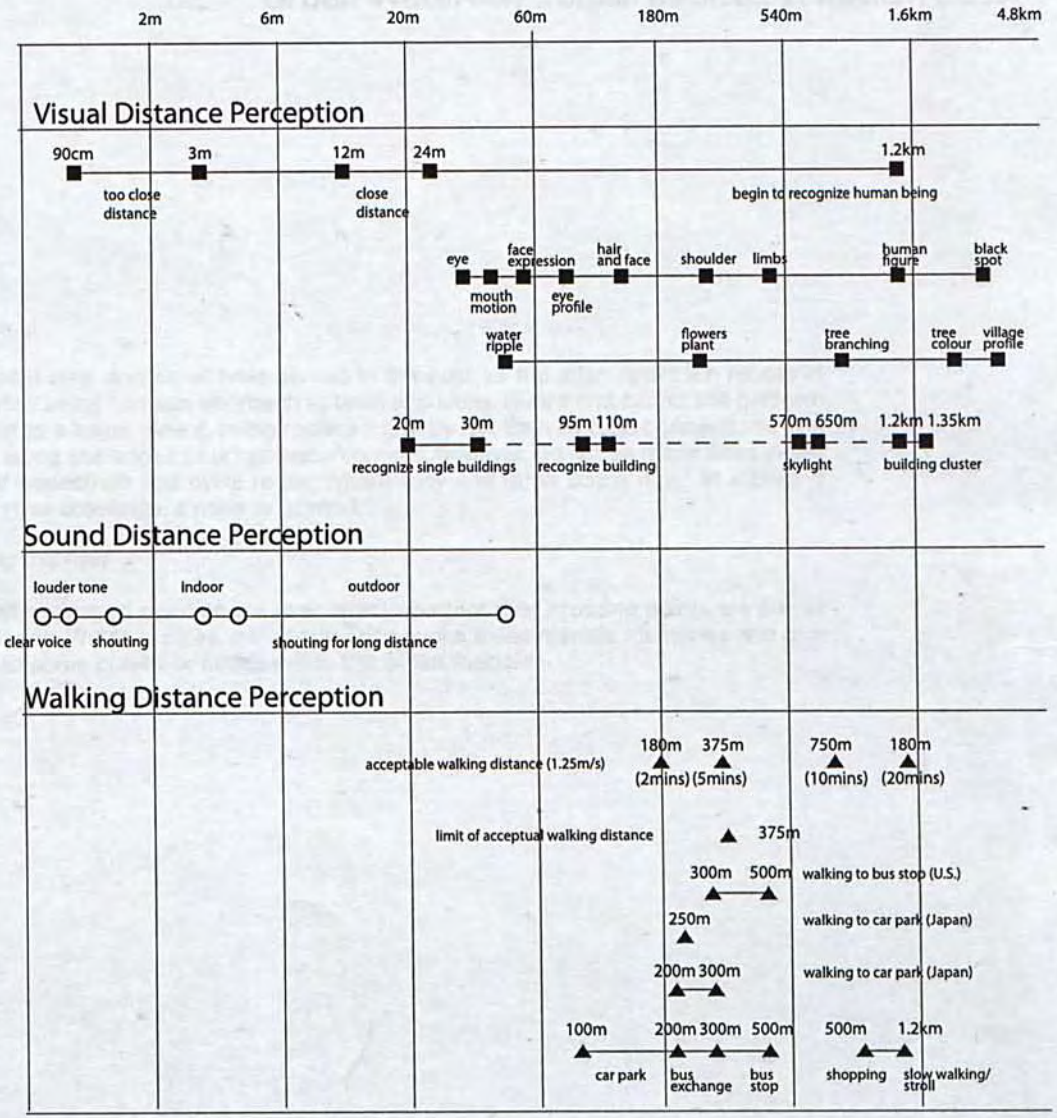
**Relationship between the width of rivers and the height of riverside building**




| D / H | SPACE PERCEPTION | HUMAN FEELING |
|---|---|---|
| 0.5   | able to approach, with sense of narrow | sense of enclosure<br>partly visible to the opposite riverside<br>sense of claustrophobia |
| 1   | balance between the height and the width | more harmony of the height and the space<br>sense of enclosure<br>totally visiblt to the opposite riverside |
| 1.5   | | |
| 2   | distant with sense of openness | visible to the oppsite riverside building<br>if >2.5, sense of laustrophobia caused |
| 3   | | occupy overall view with clear boundary, but details neglected |
| 4   | less enclosure | harmonize with the surroundings. the max. D/H for the courtyard and plaza |
| 6   | min. enclosure | |
| 8   | no enclosure<br>sense of openness<br>sense of sea | |

**Good Ratio**

**Comfortable Ratio**


2m
6m
20m
60m
180m
540m
1.6km
4.8km
Visual Distance Perception
90cm
too close distance
3m
12m
close distance
24m
1.2km
begin to recognize human being
eye
mouth motion
face expression
eye profile
hair and face
shoulder
limbs
human figure
black spot
water ripple
flowers plant
tree branching
tree colour
village profile
20m
recognize single buildings
30m
95m 110m
recognize building
570m 650m
skylight
1.2km 1.35km
building cluster
Sound Distance Perception
louder tone
clear voice
shouting
indoor
outdoor
shouting for long distance
Walking Distance Perception
acceptable walking distance (1.25m/s)
180m (2mins)
375m (5mins)
750m (10mins)
180m (20mins)
limit of acceptual walking distance
375m
300m 500m
walking to bus stop (U.S.)
250m
walking to car park (Japan)
200m 300m
walking to car park (Japan)
100m
car park
200m
bus exchange
300m 500m
bus stop
500m
shopping
1.2km
slow walking/ stroll


Cliff Moughtin
Urban design theorist

River & Canal

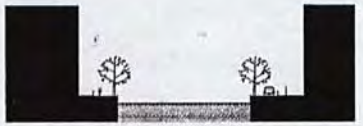
The navigable river and canal have served in the past as the mian approach routes in the city, often being he main approach to town and cities. Rivers and canals still perform this role but to a lesser extent, being replaced first by rail, then by road connections. The footpaths along the edges of urban watercourses, however, do act as major links in the network of pedestrian and cycle route. Where they and other paths meet at a briding points for river crossings, a node is formed.

Node along the river

The highest navigation point on the river or at important river crossing points are places of siginificance. Water in cities, even today, can evoke these historic memories and give emphasis to some places or nodes within the urban fabric.

# 02 Urban Waterway . Urban waterway in Western Cities

**General Urban River Riverfront Conditions in Western Cities**



Quayside Edge, at Amsterdam

Walkway with setback bulidings along river edge. Quayside Edge is a typical design used in big western cities. The waterway is used as an alignment of either pathways or motorway. With proper design scale, it could create a harmonic relatonship to the adjacent residential development. The pedestrian walkway along the river edge could be used as circulation, parking lot and leisure space.

Cliff Edge at Venice

For the residential use, the design of sharp building edge would restrict the access to the buiding from the waterway. It is often use d in the waterway network like Venice rather than a single inear waterway. For the Industrial use, this sharp edge could facilitate the loading of the goods from the warehouse to the boats.

Bank Edge, at Boston

The river interface provides a large space for different leisure activities. This kind of interface is widely adopted in the large public park.

Perforated Edge, at Florence

The design of perforated edge increase the permeability of the wateredge to the inland area. It also enhance the wateredge experience from longitudinal to transverse. Beisdes, the monumental buildings and the piazza could enhance the spatial experience along the linkage and create a sense of node to encourage the people to access to the riverfront.

http://www.uncp.edu

http://www.ecycletours.com

http://www.world-travel-photos.com

http://mw2.google.com

## General Node Conditions along the River in Western Cities

Ponte di Rialto,
at Venice

The Rialto Bridge connected the Rialto Bridge connected the Rialto market on the eastern bank to the other side. The covered slope walkways carry rows of shops as an impotant linkage in the commerical zone reflecting its market value and shown as one of architectural icons in Venice. The bridge is revealed as a street extension rather than a elevated pathway.

www.wallpaperweb.org

Torensluis,
at Amsterdam

As a remarkable ~38m wide bridge in the downtown of Amsterdam, it seems to be a landscape rather than a bridge. And, it not only serves as a circulation path but also provides possibility for different activities. The wide bridge surface could provides spaces for cafeteria and open leisure space for local citizens.

Ponte Vecchio,
at Florence

The Ponte Vecchio, being a medieval bridge over the Arno River consist of two part. The upper part is the Vasari Corridor built in 1565 which offers a private pathway to connect the Palazza Vecchio and Palazza Pitti. On the ground level, there are Jewelers, art dealers and tourists to gather around and form a vibrant street life. This bridge forms an integral continuity from the town hall to the southern back of the river.

http://fr.academic.ru

# 02 Urban Waterway . Places to Visit and Precedence to justify the selected country/ place of visit


**Case Selection**

Suzhou Creek
Cheonggyecheon
Malacca River

Since the research proposal would be further used as reference for a real revitalization project of Kai Tak River in Hong Kong, the chosen places of visit would be comparative or show the potential to be modified to fit into Hong Kong urban context. Although the economics, building density, population and living style in those cities I chose are not the same, those backgrounds lead different characteristics of the urban river and work out various merits which could be used as a reference for the poster project and make the whole research become more all-rounded. To make a comparative study, the cases of urban river example I am going to study would have similar hardware (form and scale) but different software like the local culture, living style, user pattern, religion etc. generate various urban environment and scenarios for me to investigate.

Thus, how to discover the unique merit via first hand observation and investigate the potential to further modify to be applicable to other Asian countries would be very changeling and the most important part of this research.

Concerning the cases of urban river in Asian countries, I try to select several cities which are widely distributed in Southeast Asia based on the difference of the climate and the culture in those countries. More environmental design technique

to deal with specific climate would be observed in various climate and the various living styles could indicate how the public space is formed to fit into the distinct end-users.

Cheonggyecheon (Seoul, Korea) would be at the top priority as it is regarded as one of most successful urban river restoration project. It is promoted as a sightseeing spot and the proud of Seoul, so it does not only act as a general urban public space but also a focal point of the city. But, how often the local use this kind of public space and how it's connected to the surroundings is always overlooked. What's more, some organizations also aroused the concern of the sustainability of Cheonggyecheon simultaneously as the river is not a natural waterway and lots energy for the water pumping is used to support the artificial landscape. It is a good chance to think about how to get a good balance between flood control, ecology, city development and landscape design.

Next, as the factories, power plants and industries etc. along the Suzhou Creek (Shanghai, China) are revitalized for adaptive re-use like the cluster of artists' workshop / galleries recently, the potential of the Suzhou Creek restoration is aroused among the public. Suzhou Creek provide a good scenario to let us to think about the interaction or cooperation between new programs (eg. Artist village development) and the existing urban condition to facilitate the urban river restoration.

As I would choose Kai Tak River, Hong Kong SAR, China as a real conservation project in the poster session, Malacca River development would also be an appropriate place for me to study how the urban river design works with the colony background. And the sharp contrast of architecture style between two sides of riverbank also makes the study become more interesting. And, as UNESCO's World Heritage City, Malacca has lots of historical buildings or monuments which enriche the urban context and arouses the awareness of the interaction of heritage and the urban open space.

Actually, Bangkok canal is also a nice option for study, which surprisingly serves quite a lot people including the local traveling around Bangkok and provides an interesting scene of public space like marketplace, would show the potential of a good example of a linkage between the waterway and the surrounding urban fabric. Besides, the organic pattern of the watery Chao Phraya River Delta development in Bangkok indicates its specific characteristic and the contrast among others developed Asian cities. Since maximum three countries could be chosen and Malacca is required to be included for the study, Malacca would be selected instead.
For Singapore, undoubtedly she shows great concerns on the heritage conservation and it makes the Singapore River such as a human landscape which would be a great example of the hybrid of heritage and open space in city planning. Regarding the similarity of the urban context of the Singapore and Malacca, Singapore is thus eliminated.

# 上海 蘇州河

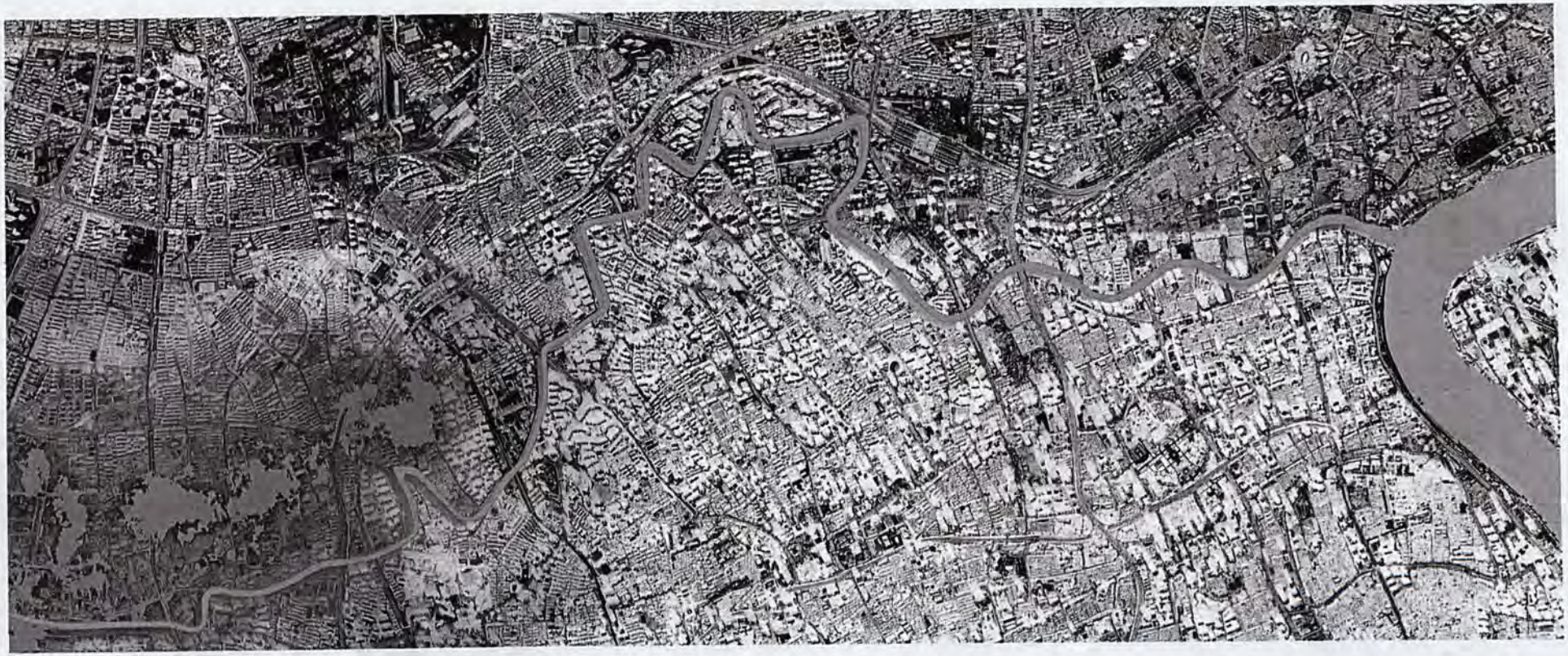
Shanghai Suzhou Creek

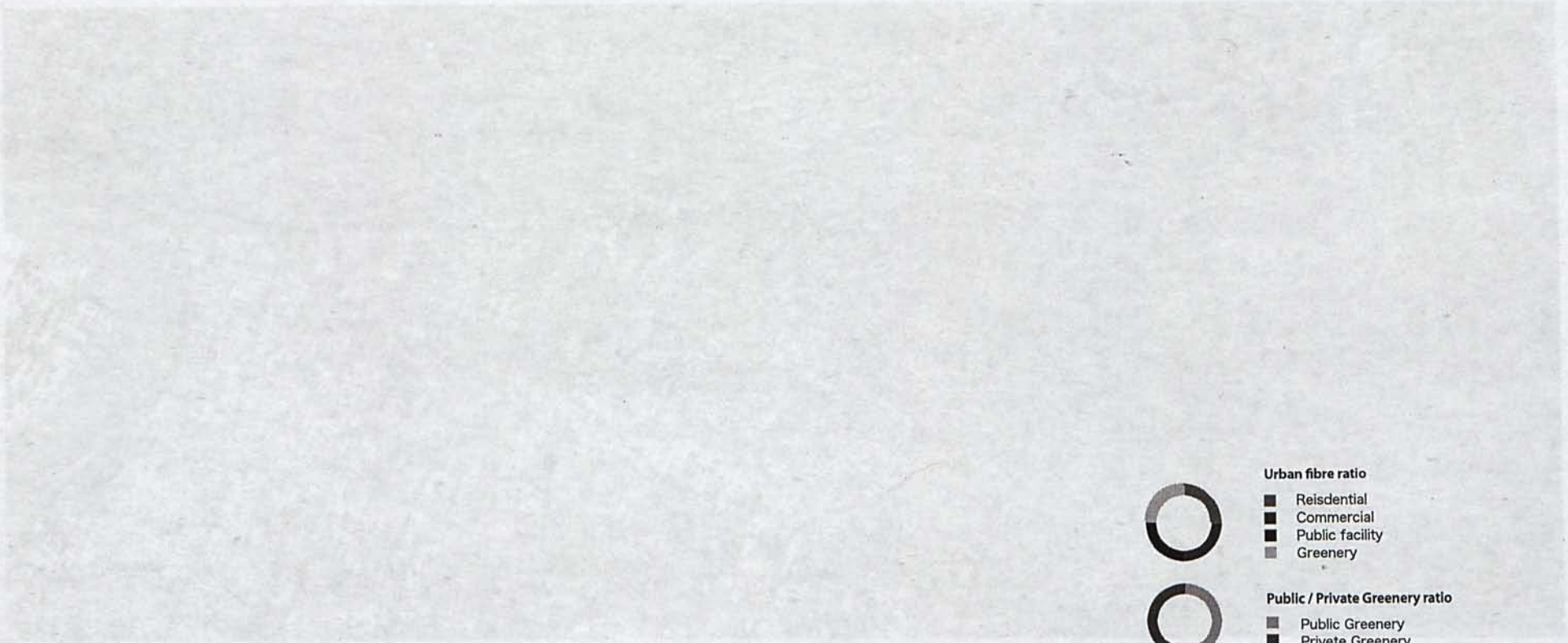
SHANGHAI

| | |
|---|---|
| Urban Area: | 7,037 km2 |
| Population: | 19,210,000 ppl (2009) |
| Density: | 2,729.9/km2 (7,070.3/sq mi) |
| Parkland: | 130km2 |

SUZHOU CREEK

| | |
|---|---|
| Length of river: | 54 km (24 km restorted) |
| Width of river: | 45 m (average) |
| Depth of river: | 2-4 m (at low tide) , 7-8 m (at high tide) |
| Average net flow: | 6m3/s (average) , more than 10m3/s (at river mouth) |
| No. of tributaries: | 6 (Mudugang, Pengyuepu, Zhenrugang, Huacaogang, Xinjinggang and Shenjigand) |
| Design Focus: | Riverbed & River embakment |







**Urban fibre ratio**

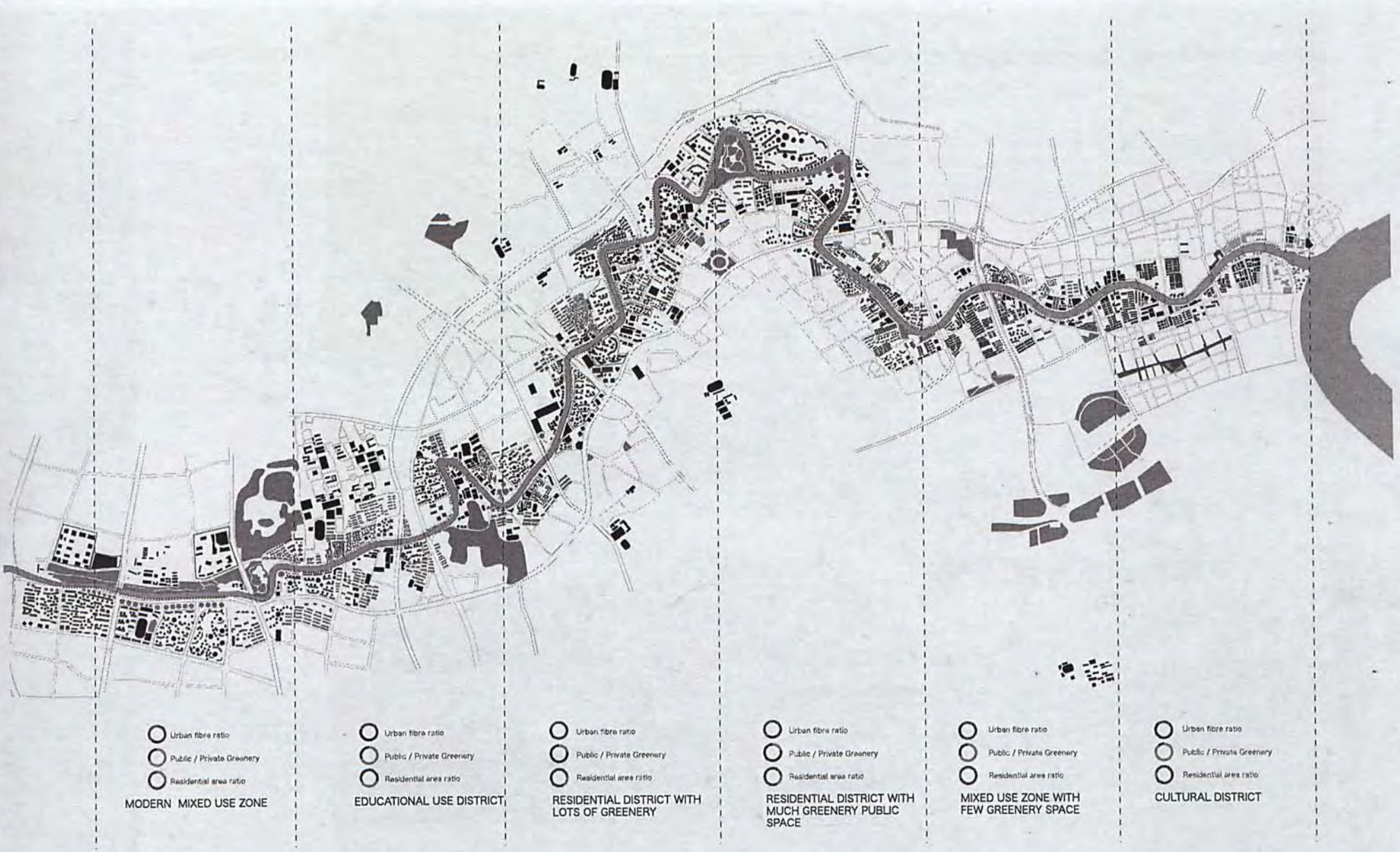
- Reisdential
- Commercial
- Public facility
- Greenery

**Public / Private Greenery ratio**

- Public Greenery
- Privete Greenery

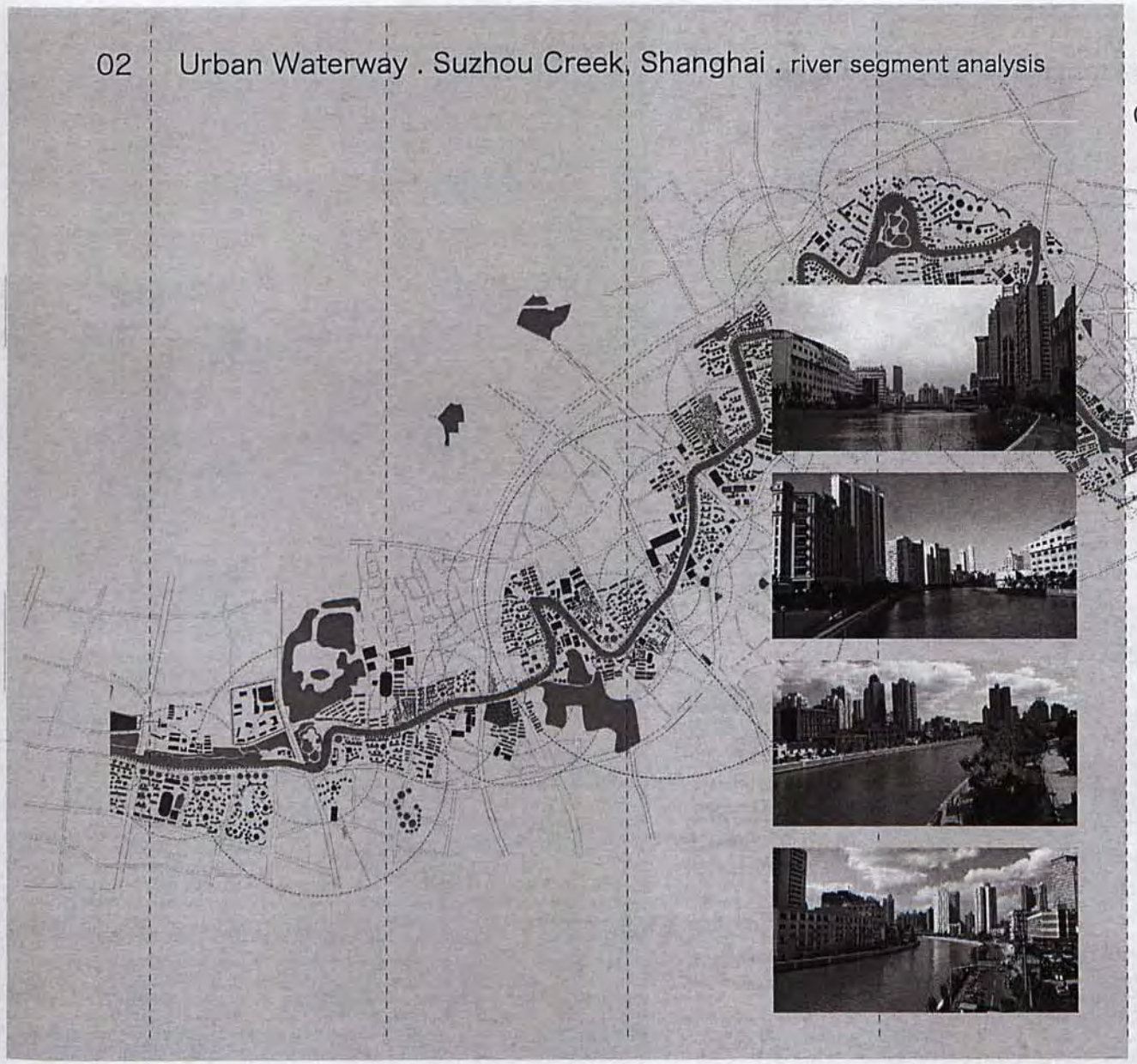
**Residential area ratio**

- Traditional Early Settlement (shack & Longtong)
- Commmity Estate
- Modern Estate


Urban fibre ratio
Public / Private Greenery
Residential area ratio
MODERN MIXED USE ZONE
Urban fibre ratio
Public / Private Greenery
Residential area ratio
EDUCATIONAL USE DISTRICT
Urban fibre ratio
Public / Private Greenery
Residential area ratio
RESIDENTIAL DISTRICT WITH LOTS OF GREENERY
Urban fibre ratio
Public / Private Greenery
Residential area ratio
RESIDENTIAL DISTRICT WITH MUCH GREENERY PUBLIC SPACE
Urban fibre ratio
Public / Private Greenery
Residential area ratio
MIXED USE ZONE WITH FEW GREENERY SPACE
Urban fibre ratio
Public / Private Greenery
Residential area ratio
CULTURAL DISTRICT

02 Urban Waterway . Suzhou Creek, Shanghai . river segment analysis

02 Urban Waterway . Suzhou Creek, Shanghai . river segment analysis



MIXED USE ZONE
WITH FEW
GREENERY SPACE

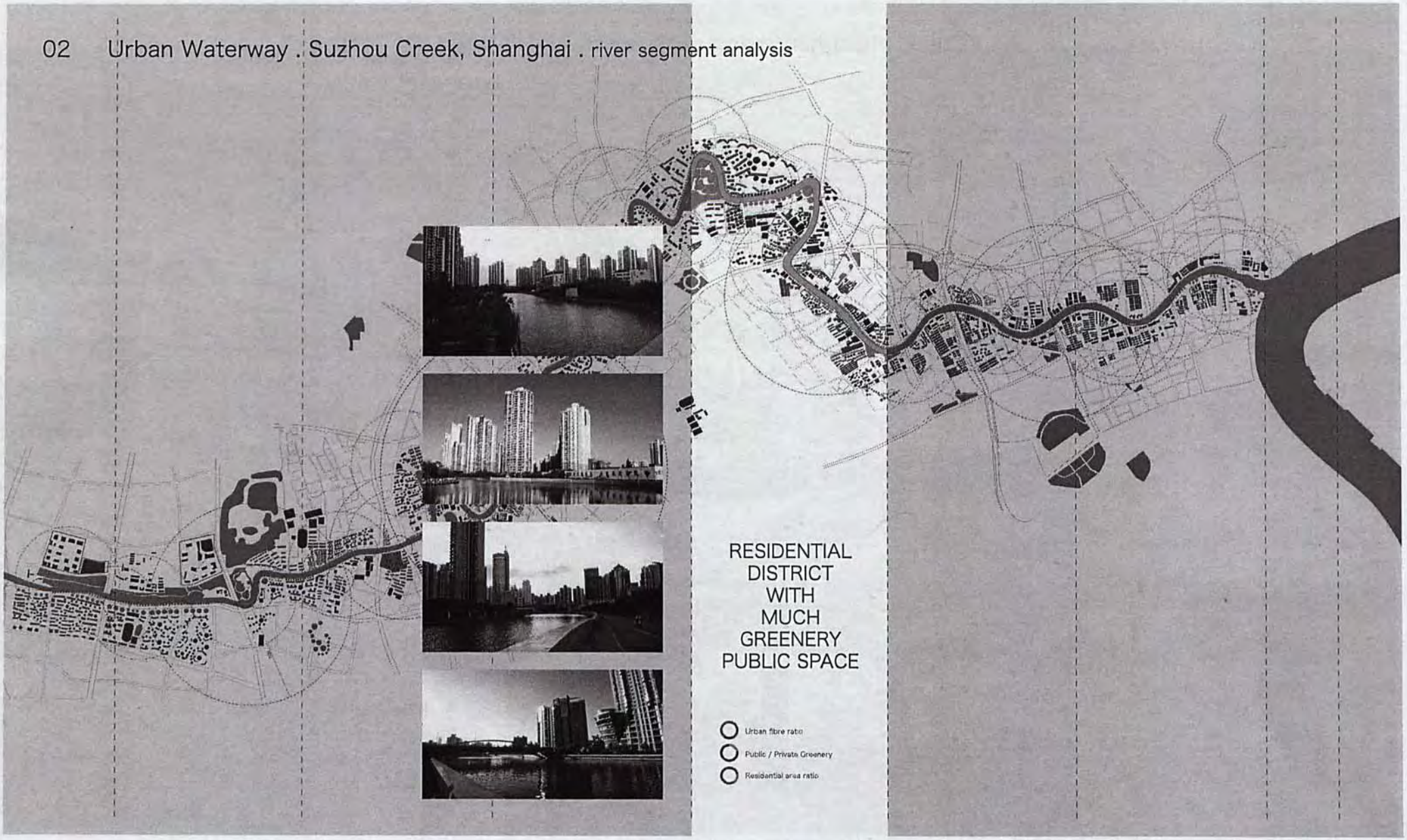
Urban fibre ratio

Public / Private Greenery

Residential area ratio

MIXED USE ZONE WITH
FEW GREENERY SPACE

02 Urban Waterway . Suzhou Creek, Shanghai . river segment analysis



RESIDENTIAL
DISTRICT
WITH
MUCH
GREENERY
PUBLIC SPACE

- Urban fibre ratio
- Public / Private Greenery
- Residential area ratio

02 Urban Waterway . Suzhou Creek, Shanghai . river segment analysis

RESIDENTIAL DISTRICT WITH MUCH PRIVATELY OWNED GREENERY

- Urban fibre ratio
- Public / Private Greenery
- Residential area ratio

# 02 Urban Waterway . Suzhou Creek, Shanghai . river segment analysis

EDUCATIONAL
DISTRICT

Urban fibre ratio

Public / Private Greenery

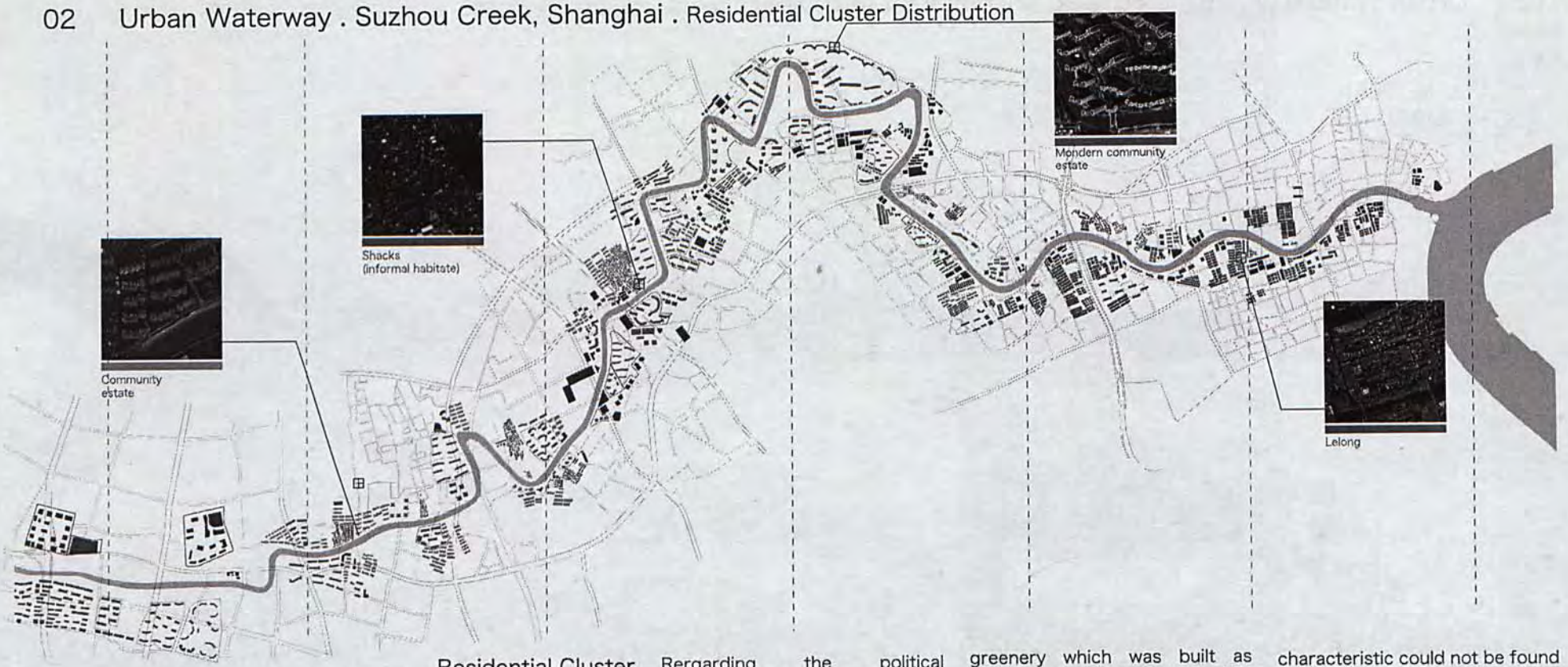
Residential area ratio

02 Urban Waterway . Suzhou Creek, Shanghai . river segment analysis

MODERN
MIXED USE
ZONE

Urban fibre ratio
Public / Private Greenery
Residential area ratio

# 02 Urban Waterway . Suzhou Creek, Shanghai . Residential Cluster Distribution



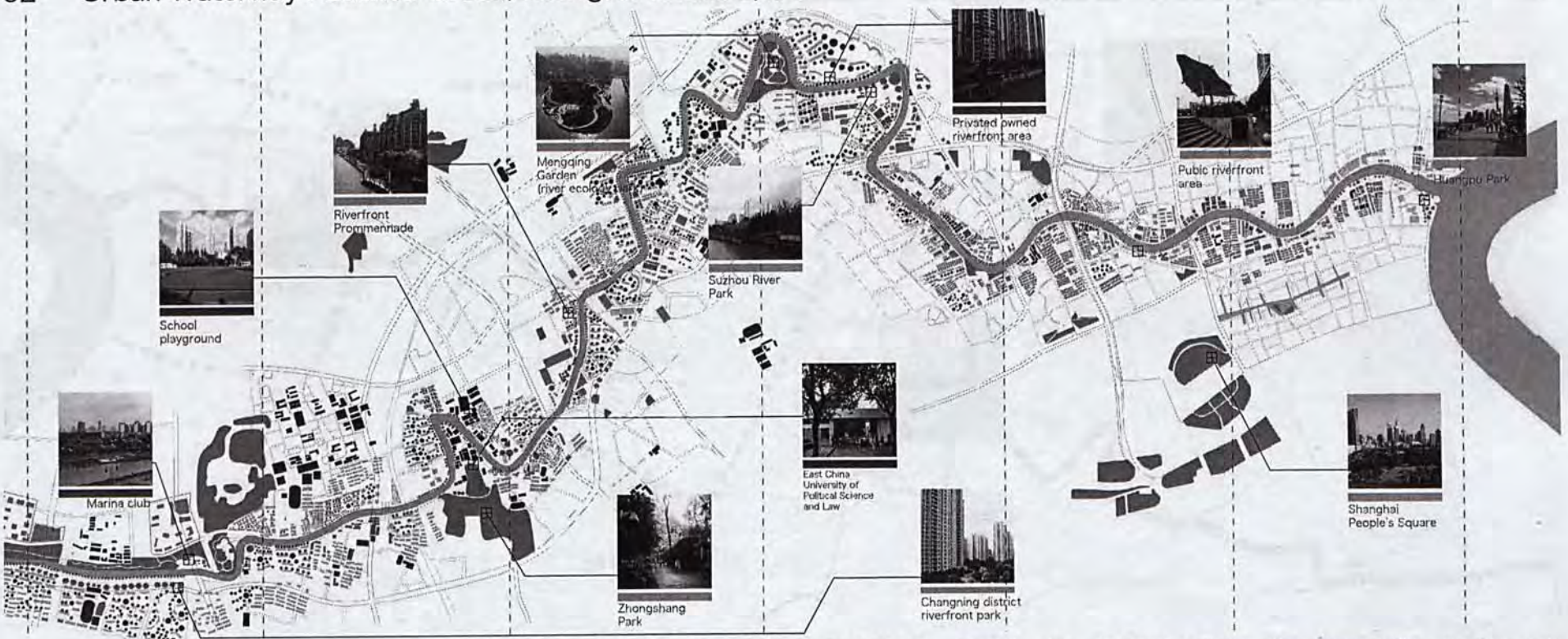

## Residential Cluster Distribution

Shacks
Lelong
Community estate
Modern Community estate

Rergarding the political landscape, the distribution of different type of residential housing estate / cluster is also various along different segment of Suzhou Creek.

And a large amount of modern estates have been built along the riverfront. Within their site boundary, a large portion of greenery which was built as privately owned hinder the public to access to the riverfront.

On the other hand, the traditional early settlements are relatively energetic as compared with the modern luxury housing estate since lot of early settlement would be built with local market in between which make the whole community more lively. This characteristic could not be found in the modern urban development especially in the residential area.



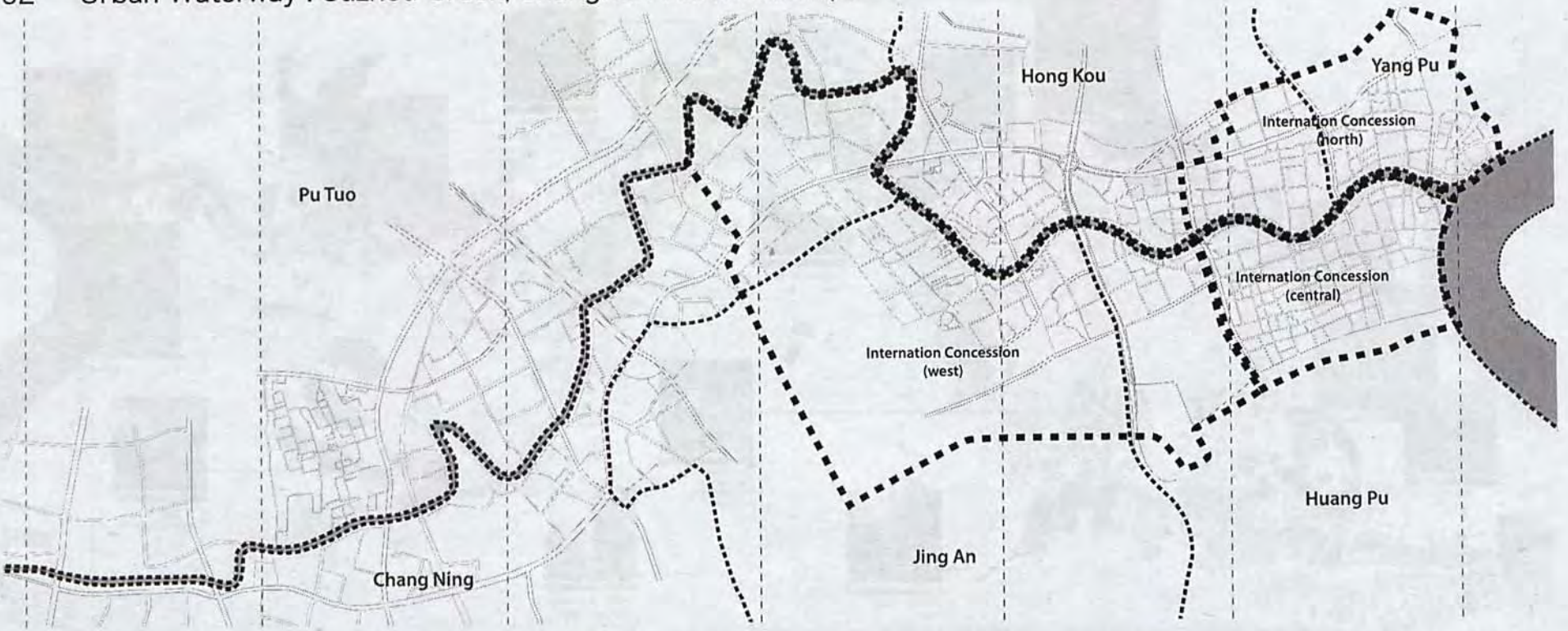

## Public Space

Greenery
Schools, collages, institute and University

After the river restoration, generally, the most of waterfront area became accessible and few area were design as promennade, the continuity of the waterfront (longitudinal drection of the rier)) is thus enhanced. Then, quite a lot greenery were installed along the Suzhou Creek.

And the most of waterfront area became accessible, the continuity of the waterfront is also enhanced. Yet, not all of them are completely opened for public use since certain portions of greenery are privately owned and gates are built to prevent the public access. The most critical problem would be the less accessibility to the riverfront caused. It's because many modern housing estates were developed within the whole land lots, the linkage including the pedestrians and the motorway is shifted to the edge of those lots. Although the environment along rehabilitated riverfront was highly improved and many pubic spaces were also introduced for the local community. However, considering the accessibility to the river bank area, and the appropriate people walking distance, a certain amount of local residents especially the elderly do not prefer to walk to the riverfront for leisure like morning exercising mainly because it maybe take too long time to access. In order to solve that problem, some publc education institutes would be

# 02 Urban Waterway . Suzhou Creek, Shanghai . Political Lanscape



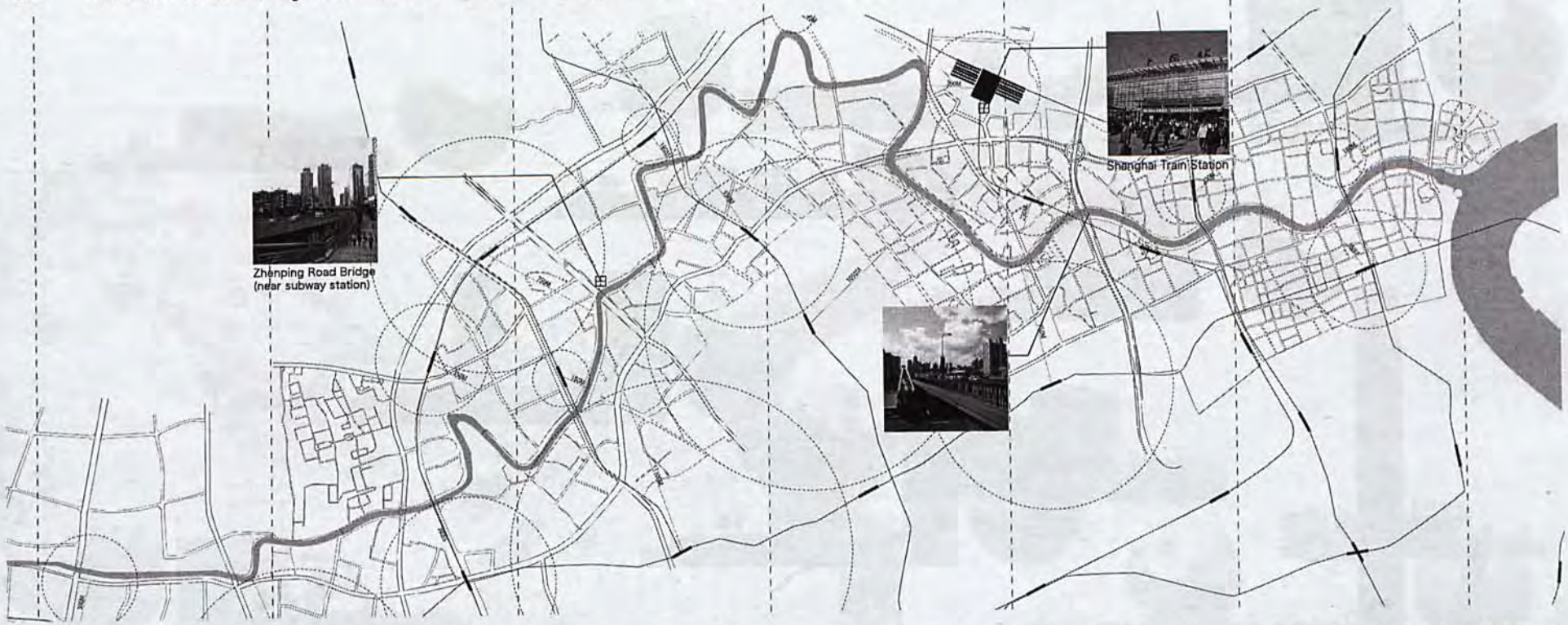

## Political Landscape

District Boundary & Concession Boundary

Rergarding the concession boundaries, the buildings density, buildings' style, the numbers of historical buildings and the speed of urban renewal are also various along the river.

Besides, the intervals of the rivers belong to different district in Shanghai city area, as the distinct urban plannign strategies would be adopted within each district. Due to teh Shanghai Expo, a new commitee was established and manage the whole master layout plan and the river rehabilitation project. Therefore, the restoration work along Suzhou creek also follow similar design strategies.Yet, the progresses of urban renewal around different segments of the river are very obviously different.

# 02 Urban Waterway . Suzhou Creek, Shanghai . Infrastructure




## Infrastructure

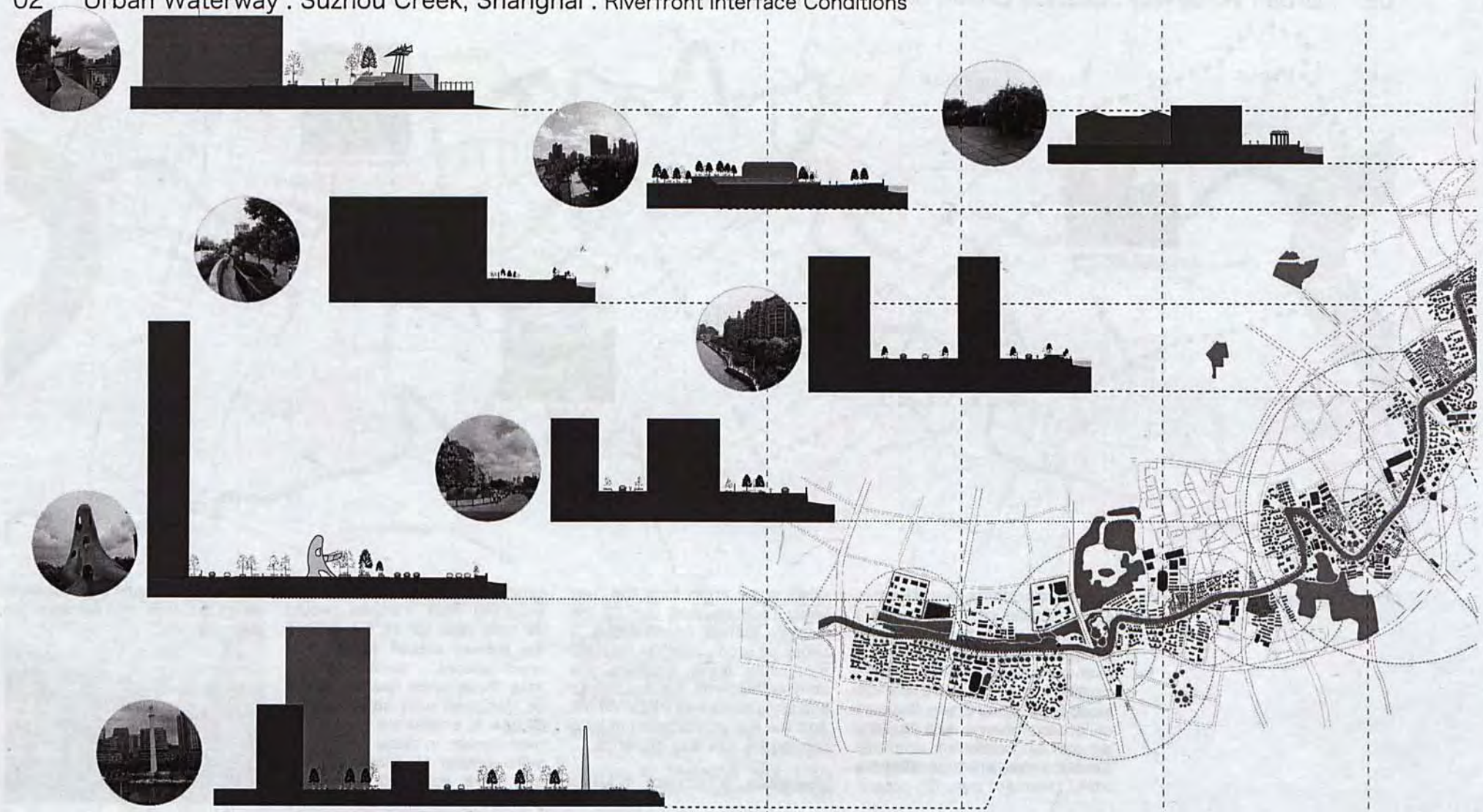
The subway network

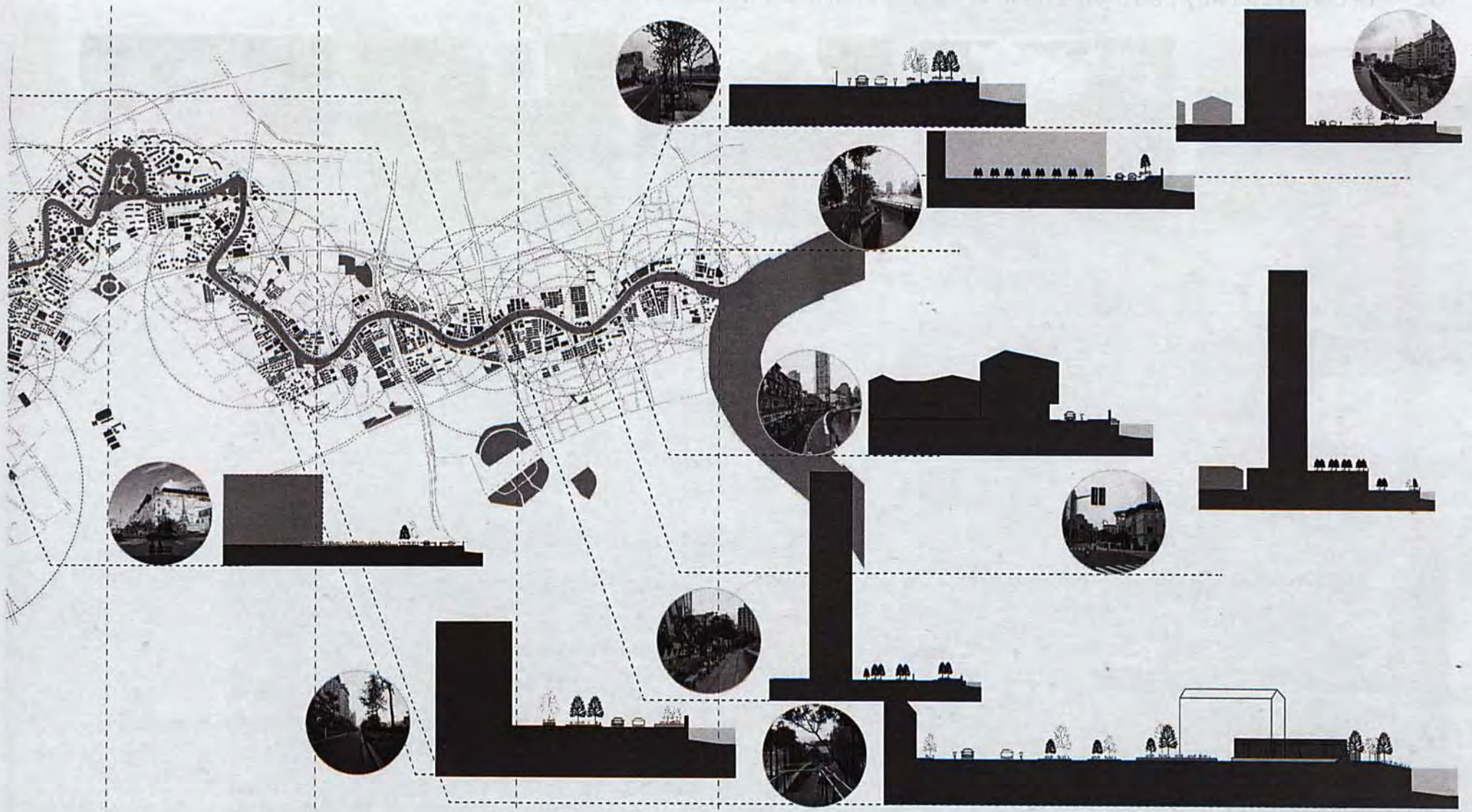
The subway stations were located along certain part of the river bank. Undoubtedly, the stations faclitate the accessibility to the river bank.Regarding the uneven distribution of subway stations along the Suzhou Creek, the pace of urban renewal and building density at different intervals along the river are thus different.

While some areas long the river being redeveloped due to the subway station construction, a series of urban renewal espically the urban areas inculding the early settlements like the shacks and LongTangs was triggered off. And the age stratification of local community was also influence.

Meanwhile, a modern housing estate maybe including the shopping mall complex would be bulit near or at the top of the subway station. More large open spaces were cohered. And, those open spaces should be designed with consideration of how to colaborate with urban river design in order to attract more people to access to the river bank area and thus more programmes could be plugged in along the river and enhance the diversity.

02 Urban Waterway . Suzhou Creek, Shanghai . Riverfront Interface Conditions





## 02 Urban Waterway . Suzhou Creek, Shanghai . Riverfront Interface Conditions

### Interface condition

A large greenery area with sport court and prommannade

### Activities

Outdoor sport, leisure use for surrounding residents

# 02 Urban Waterway . Suzhou Creek, Shanghai . Riverfront Interface Conditions

## Interface condition

A wide greenery area in between teh riverbank and the motorway

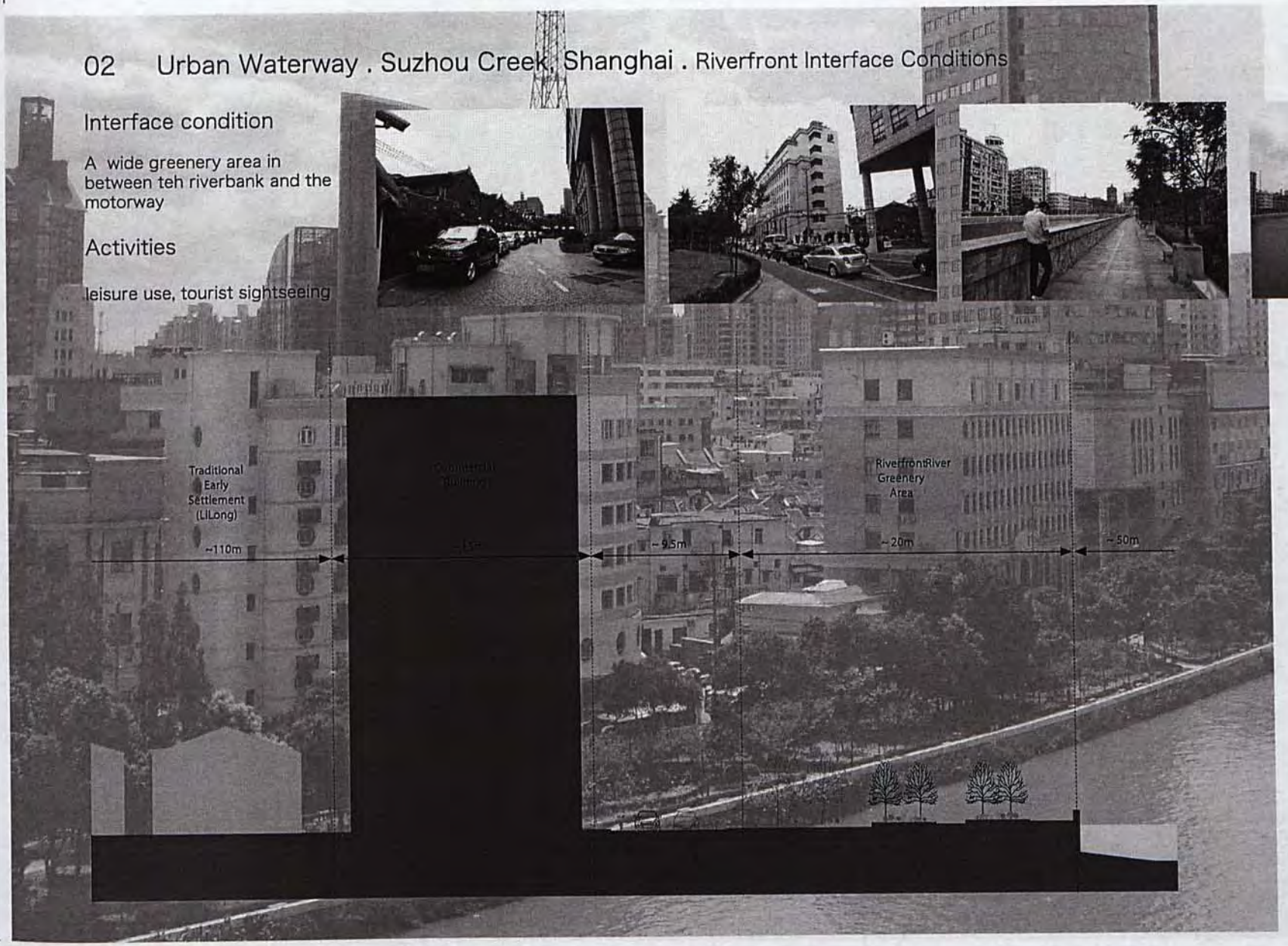
## Activities

leisure use, tourist sightseeing









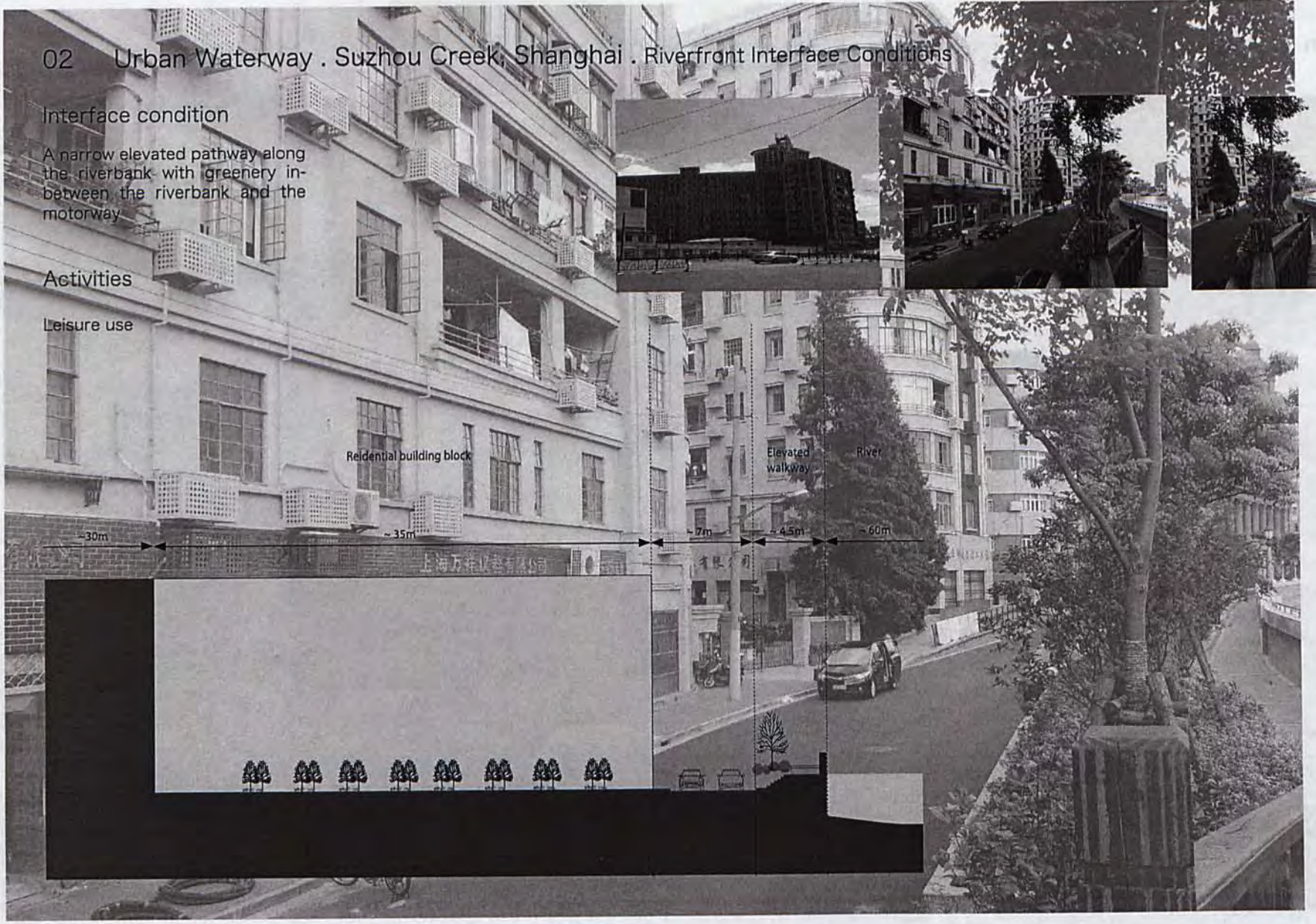
# 02 Urban Waterway . Suzhou Creek, Shanghai . Riverfront Interface Conditions

## Interface condition

A narrow elevated pathway along the riverbank with greenery in-between the riverbank and the motorway

## Activities

Leisure use



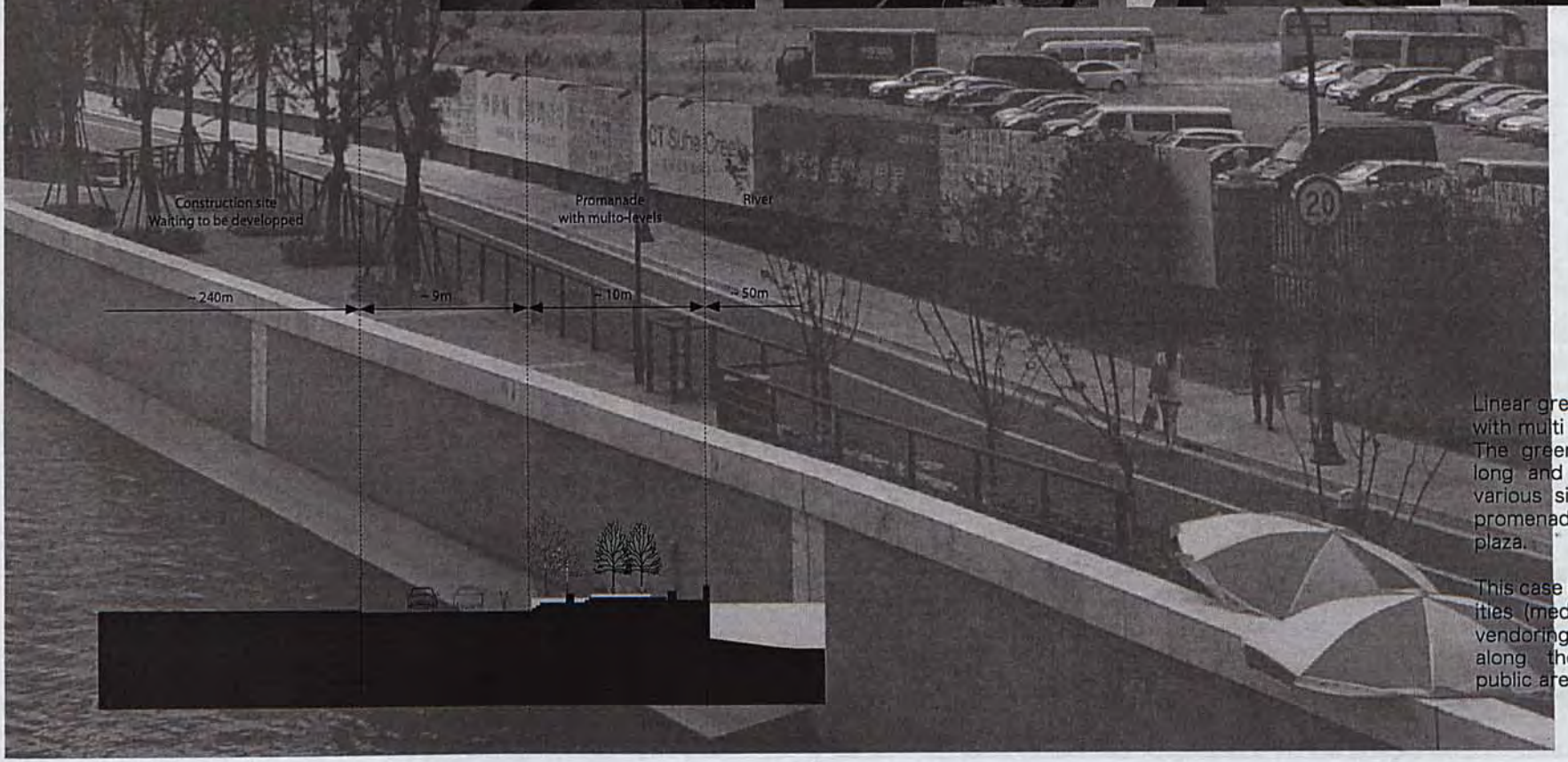
# 02 Urban Waterway . Suzhou Creek, Shanghai . Riverfront Interface Conditions

## Interface condition

A multi-level platform along the riverbank

## Activities

Leisure use(e.g. strolling)




Linear green belt
with multi levels and spaces
The greenbelt is aournd 245m long and 10m wide comprises various size of spaces like the promenade, pocket space and plaza.

This case illustrates various activities (meditation, strolling, street vendoring) would possibly occurs along the spacious riverfront public area.

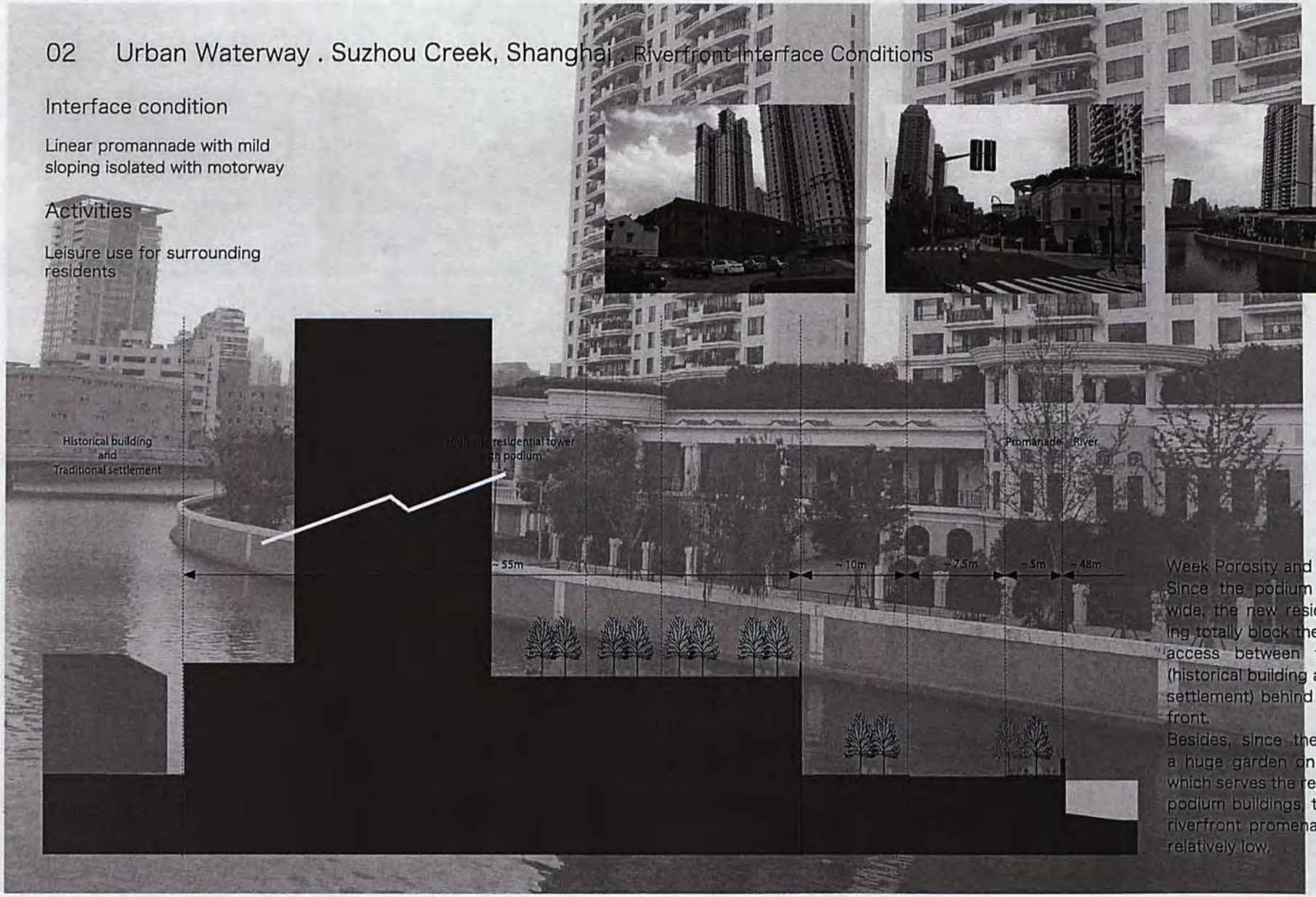
# 02 Urban Waterway . Suzhou Creek, Shanghai . Riverfront Interface Conditions

## Interface condition

Linear promannade with mild sloping isolated with motorway

## Activities

Leisure use for surrounding residents




Week Porosity and Accessibility

Since the podium is huge and wide, the new residential building totally block the view and the access between the buildings (historical building and traditional settlement) behind and the riverfront.

Besides, since there is already a huge garden on podium level which serves the residents in that podium buildings, the use of the riverfront promenade would be relatively low.

# 02 Urban Waterway . Suzhou Creek, Shanghai . Riverfront Interface Conditions

## Interface condition

A pathway and motoway infront of the row of shophouse

## Activities

Leisure use for surrounding residents, exercising, ourdoor performance


Continuous linear green belt with various amenities

The riverfront promanade is around 10m wide. Various amenities are arranged along the riverfront to let different kind of activities e.g. morning exercising plaza, exercising devices zone.

Although the open spaces are not really spacious, but since it's quite close to the adjacent residence, a plenty of the elderly, adults and kids would like to use those amenity during the morning and nightfall time.

# 02 Urban Waterway . Suzhou Creek, Shanghai . Riverfront Interface Conditions

## Interface condition

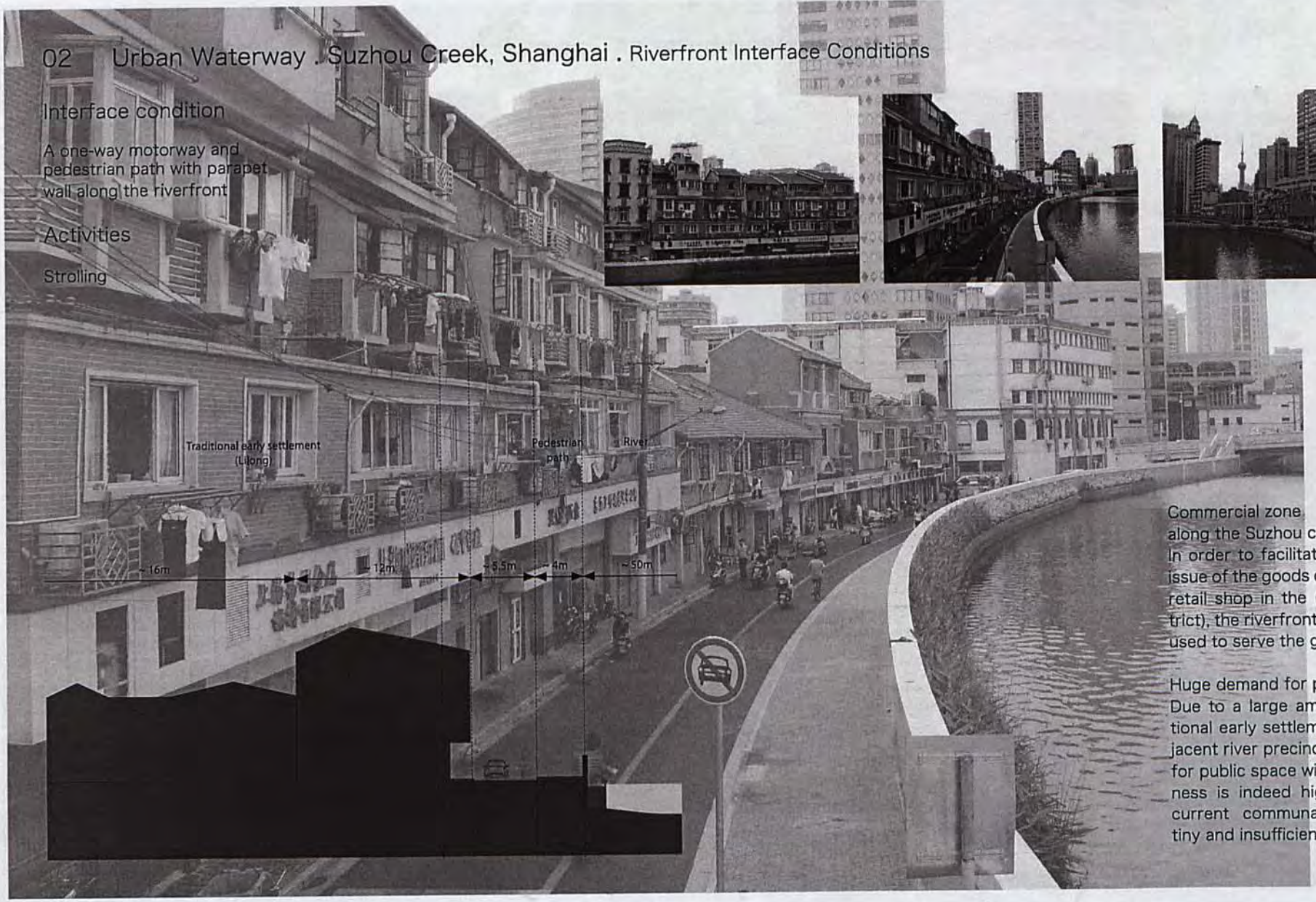
A one-way motorway and pedestrian path with parapet wall along the riverfront

## Activities

Strolling








Commercial zone along the Suzhou creek

In order to facilitate the delivery issue of the goods of the material retail shop in the (Huangpu district), the riverfront area is mainly used to serve the goods delivery.

Huge demand for public space

Due to a large amount of traditional early settlement in the adjacent river precinct, the demand for public space with great openness is indeed high since their current communal spaces are tiny and insufficient.

# 02 Urban Waterway . Suzhou Creek, Shanghai . Riverfront Interface Conditions

## Interface condition

A large piazza in between a department store and the river-front

## Activities

Leisure use for the shopping people, outdoor performance, outdoor retail shop, car


Sense of Significance

The huge building form with outstanding facade embellishment and a spacious outdoor plaza is a quite unique situation as the ordinary building density along the river is very high,

Inappropriate space arrangement

The carpark should not be located in between the department store and the river as the current design of the plaza is too segregated. If the current carpark location could be replaced by a large plaza with various retial booth. It may be a good weekend market place.

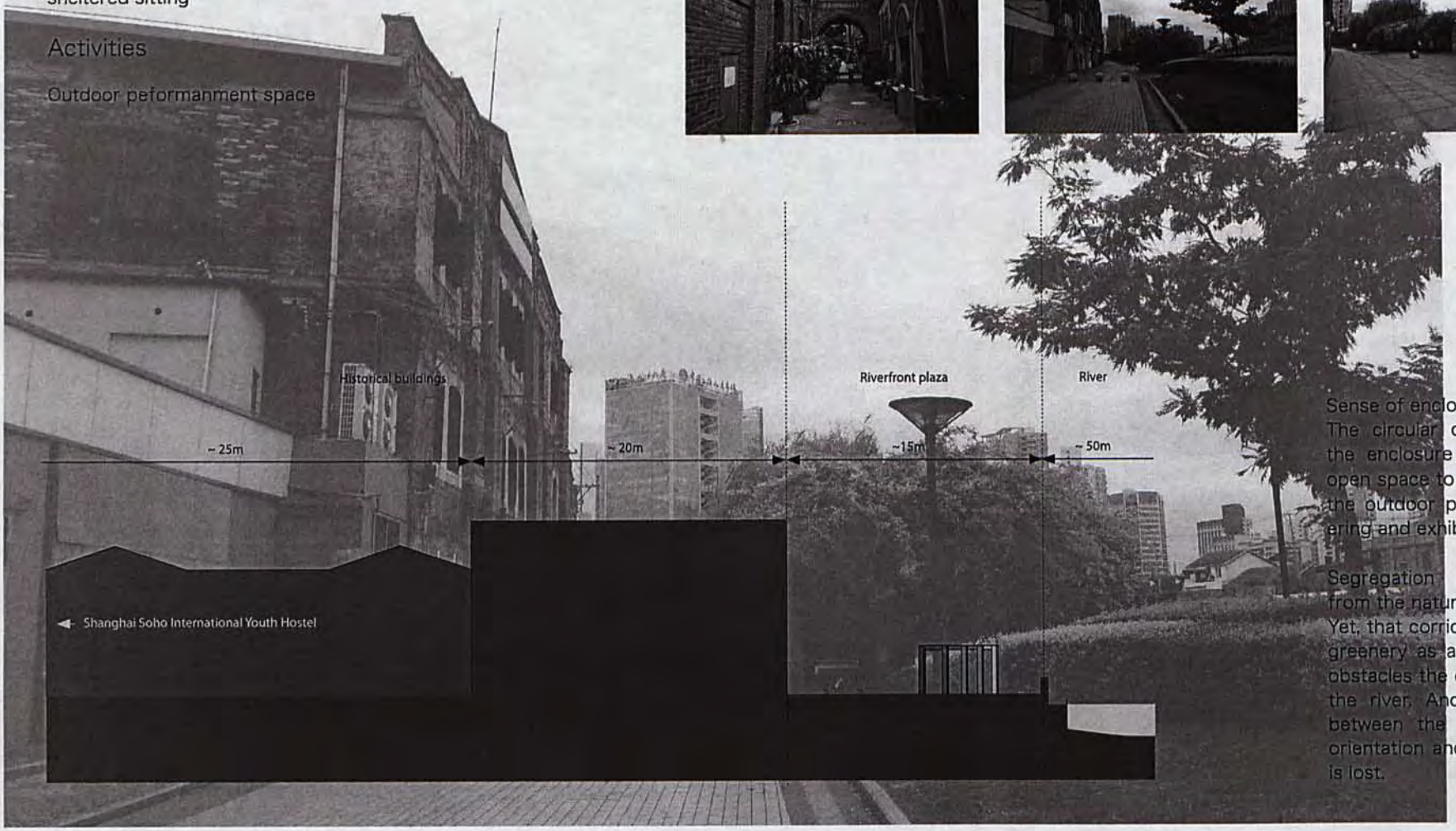
# 02 Urban Waterway . Suzhou Creek, Shanghai . Riverfront Interface Conditions

## Interface condition

A small open plaza with sheltered sitting

## Activities

Outdoor peformanment space




Sense of enclosure
The circular corridor enhances the enclosure of the riverfront open space to create a place for the outdoor performance, gathering and exhibition.

Segregation
from the nature and history
Yet, that corridor covered by the greenery as an opaque barrier obstacles the open view towards the river. And, the relationship between the historical building orientation and the Suzhou river is lost.

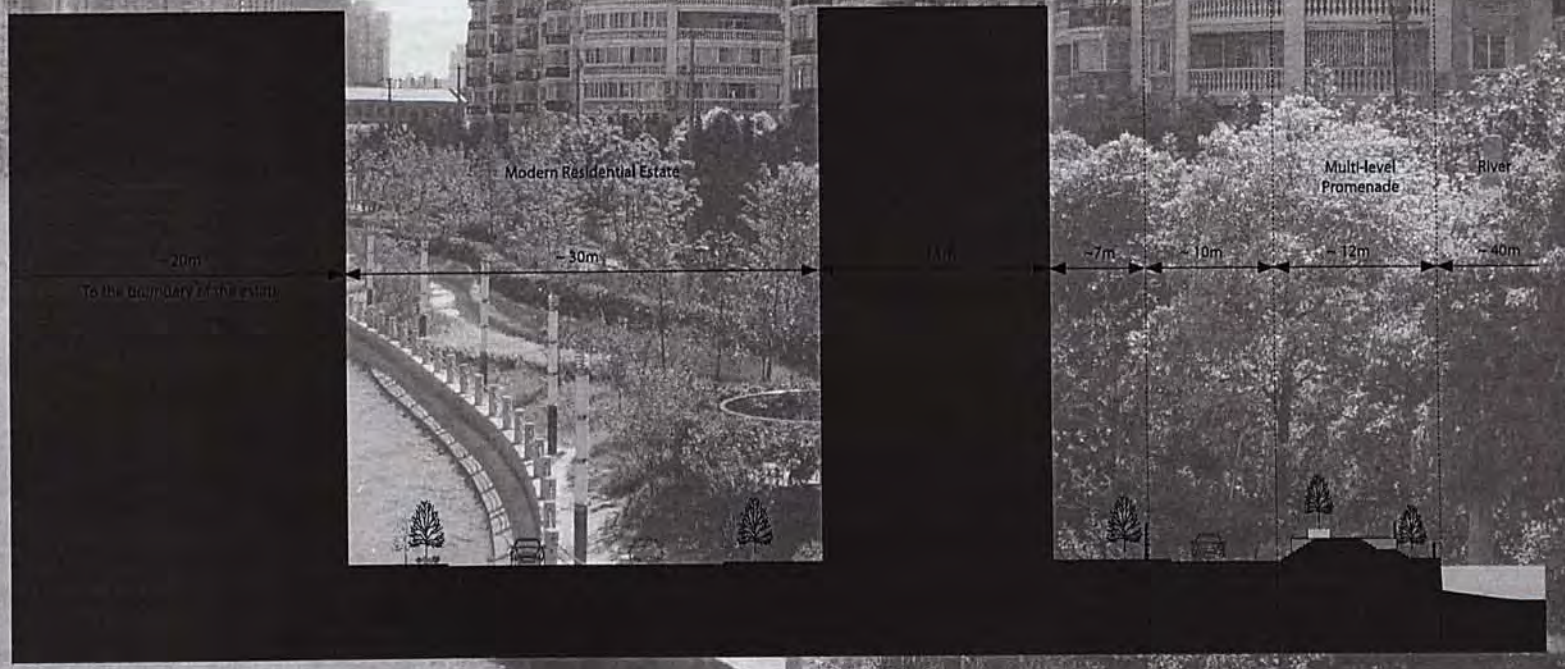
# 02 Urban Waterway . Suzhou Creek, Shanghai . Riverfront Interface Conditions

## Interface condition

Linear greenery in front of private estate

## Activities

Leisure use for surrounding residents




Continuous linear green belt
Undoubtedly, the linear green zone could embellish the whole riverfront landscape. However, the accessibility to that greenery area should be noticed. Since the access points from the city are very limited, that open greenery space is often regarded as a private subsidary garden for the adjacent luxury modern residential estate.

# 02 Urban Waterway . Suzhou Creek, Shanghai . Riverfront Interface Conditions

## Interface condition

A public park adjacent to the riverbank

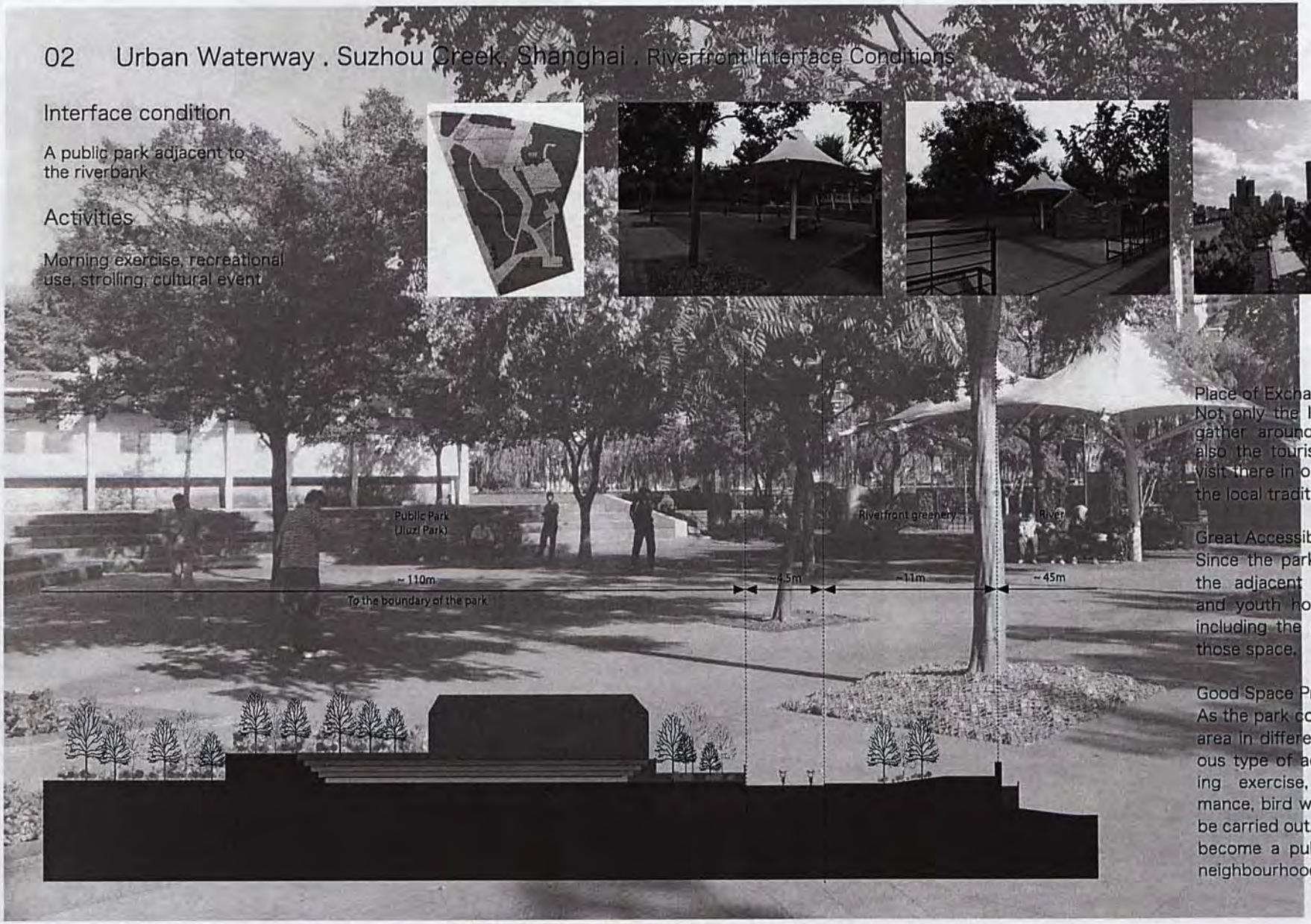
## Activities

Morning exercise, recreational use, strolling, cultural event










Place of Exchange
Not only the local would like to gather around in the park but also the tourists would want to visit there in order to experience the local tradition or lifestyle

Great Accessibility
Since the park is quite close to the adjacent residence cluster and youth hostel, many people including the elderly like to use those space.

Good Space Proportion
As the park consists of few open area in different dimension, various type of activities (eg. morning exercise, outdoor performance, bird watching etc.) could be carried out. It makes the park become a public domain in the neighbourhood.

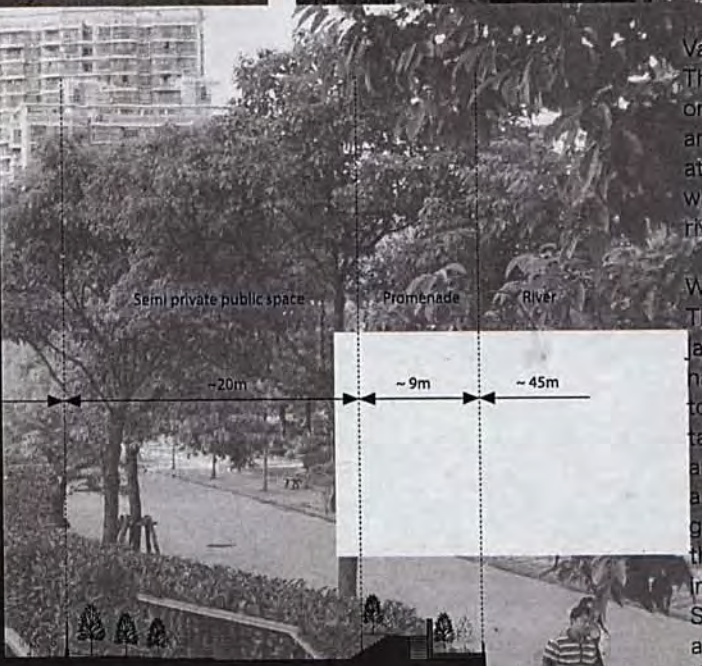
# 02 Urban Waterway . Suzhou Creek, Shanghai . Riverfront Interface Conditions

## Interface condition

Linear open space and greenery with elevated walkway and platform

## Activities

Leisure use for residents


Semi private riverfront area
Since there is only one pavement and motorway linked to this open area from the city, the higher privacy of the space attracts the local residents to access.
And, the elevated platforms created along the riverfront also enhance the sense of enclosed for that open space.

Various spatial quality
This riverfront interface case not only comprises a enclosed open area for the local, but also create a linear elevated promenade which could offer a great open river view to the users.

Weak Continuity
There is no connection to the adjacent riverfront area (longitudinal direction). For the connection to the riversides community estate (transverse direction), there are fencing/party retaining wall and a row of vegetation to segregate the riverfront public area to the large inner courtyard garden inside the estate.
Since the semi private riverfront area is already proposed to serve the surround residents, the use of those space may be lowered as it totally detected to the inner garden in thhe estate.

# 02 Urban Waterway . Suzhou Creek, Shanghai . Riverfront Interface Conditions

## Interface condition

A large green belt with sculptural building formed in between the modern estate and isolated with motorway

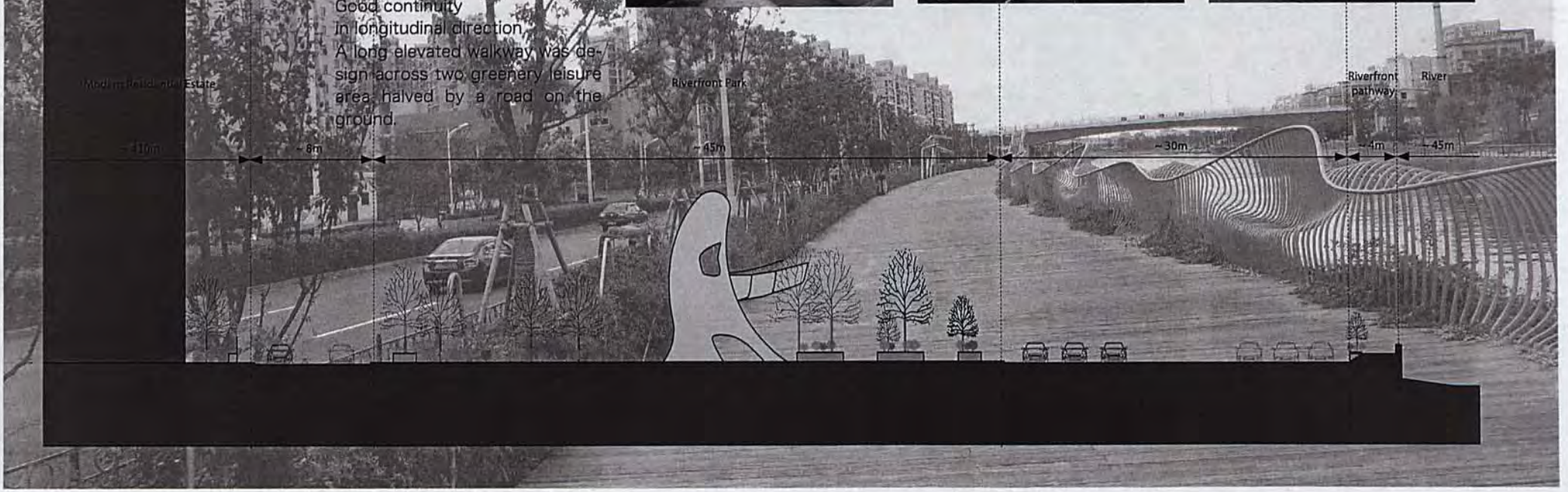
## Activities

Leisure use, observation tower for the tourist

Sense of Significance
The sculptural observation tower create a sense of significance which could not only attract the local residents but also the tourists to visit and it acts as a focal point of the whole linear greenery public space along the riverfront.

Dynamic spatial experience
The spatial arrangement was presented in three dimension, more scenarios could be created by the dynamic landscape design.

Good continuity in longitudinal direction
A long elevated walkway was design across two greenery leisure area halved by a road on the ground.



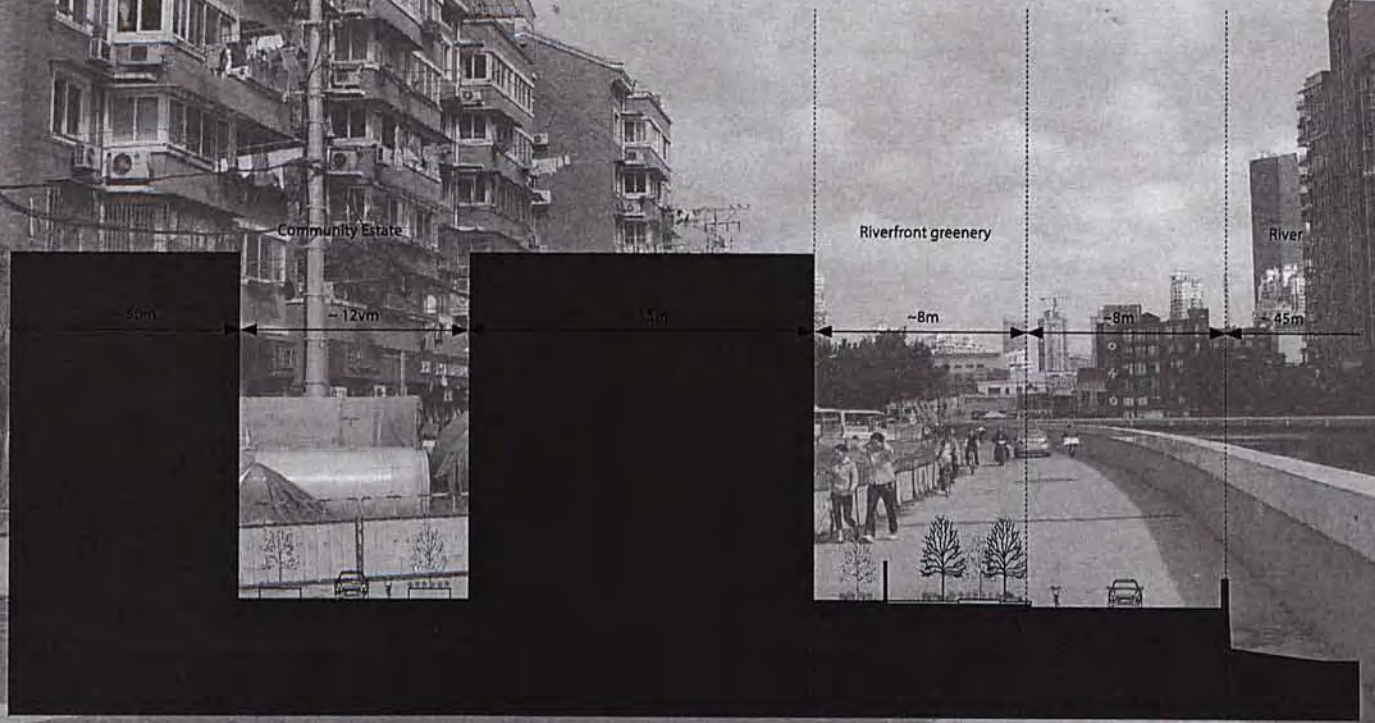
# 02 Urban Waterway . Suzhou Creek, Shanghai . Riverfront Interface Conditions

## Interface condition

Linear greenery in front of private residential estate

## Activities

vegetation




Insufficient amenity

The public greenery should be equipped with more amenities for the public to use e.g. exercise machine, bench, shelter etc.

Weak Porosity

The enclosd private public space in the estate should be re-modified to have greater connection to the riverfront area. Since the current estate design does not really fit into the context, the weak accessibilty to the riverfron area would minimise the use of riverfront space,

# 02 Urban Waterway . Suzhou Creek, Shanghai . Riverfront Interface Conditions

## Interface condition

A large piazza in between the commercial building cluster and the riverfront.

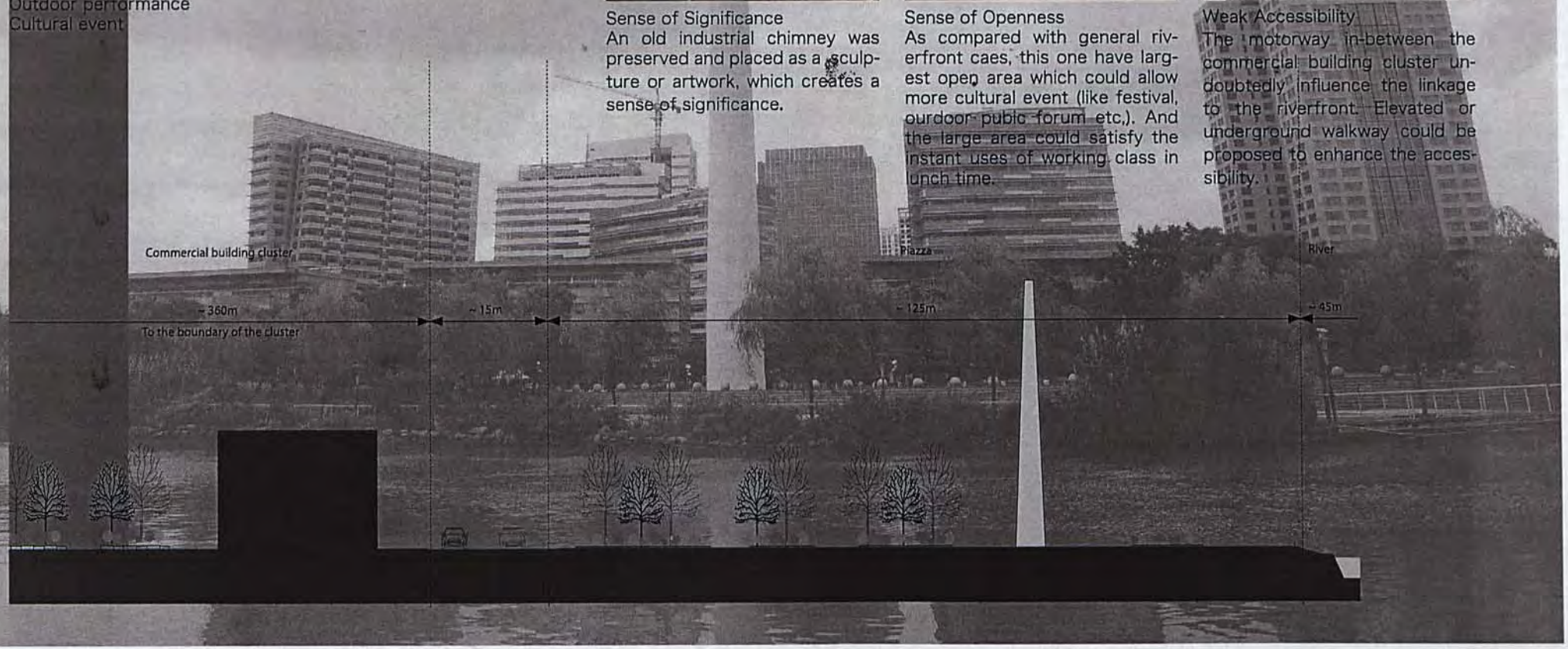
## Activities

Leisure use for the workers
Outdoor performance
Cultural event

Sense of Significance
An old industrial chimney was preserved and placed as a sculpture or artwork, which creates a sense of significance.

Sense of Openness
As compared with general riverfront caes, this one have largest open area which could allow more cultural event (like festival, ourdoor pubic forum etc,). And the large area could satisfy the instant uses of working class in lunch time.

Weak Accessibility
The motorway in-between the commercial building cluster undoubtedly influence the linkage to the riverfront. Elevated or underground walkway could be proposed to enhance the accessibility.



# 02 Urban Waterway . Suzhou Creek, Shanghai . Riverfront Interface Conditions

## Interface condition

A linear greenery space is located in front of a row of residential towers.

An one-way motorway and a bush area placed in-between the river and those towers.

## Activities

Strolling


Low Porosity
A row of the high-rise residential towers aligning with the river-front provides only one access point to the in-between public greenery, which totally minimize the use of that greeneryspace.

Low Penetration
The min 1.5m parapet wall influcen the visual connection of the river to the city.

Weak Accessibility
The motorway and bush limit the access to the riverfront

# 02 Urban Waterway . Suzhou Creek, Shanghai . Riverfront Interface Conditions

## Interface condition

A large piazza in between the commercial cluster and the riverfront

## Activities

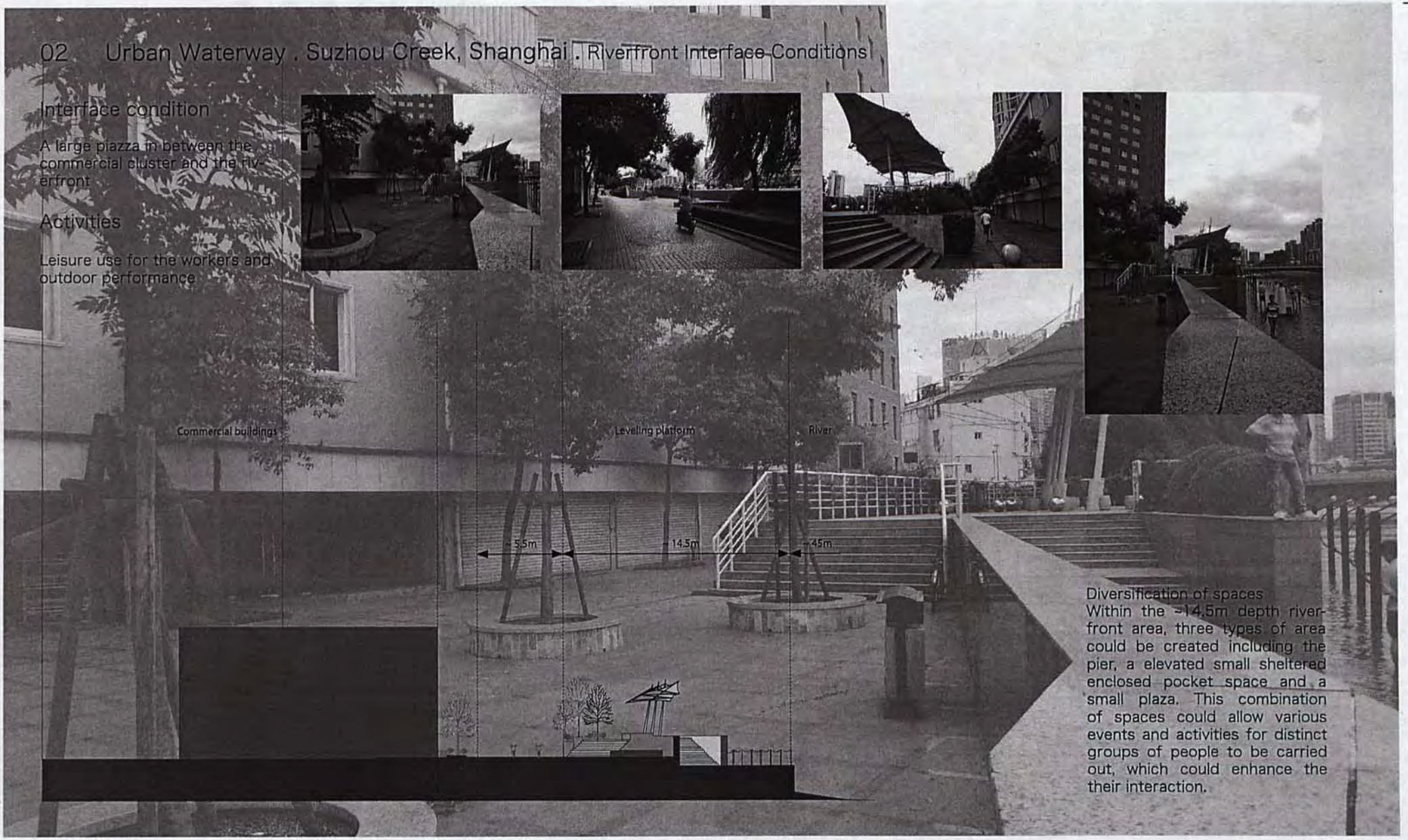
Leisure use for the workers and outdoor performance












Diversification of spaces
Within the ~14.5m depth riverfront area, three types of area could be created including the pier, a elevated small sheltered enclosed pocket space and a small plaza. This combination of spaces could allow various events and activities for distinct groups of people to be carried out, which could enhance the their interaction.

# 02 Urban Waterway . Suzhou Creek, Shanghai . Human activities in river precinct

## Communal activities


In-between space in the traditional early settlement (Lilong and shack cluster)


Pocket space in the riverfront area


Street frontage of the early settlement


Marketplace in the informal habitats.
The local residents regard the market as a place of their daily gathering or communal space.

## Recreational activities


Graffiti on the abandoned retaining wall


Playing exercise in sport court underneath the elevated highway structure


The iconic sculptural observation tower and dynamic elevated walkway in the riverfront park become a sightseeing spot facilitate the tourism along the river

## Commercial activities


Marketplace in the informal habitats


Boulevard in the city centre


Huge department store (Carrefour) attracts many people to access the adjacent open plaza and the small street market nearby


Many mobile street vendors would temporarily set up along the riverfront area including the covered area underneath the crossing bridge

沙永杰
Sha Yongjie

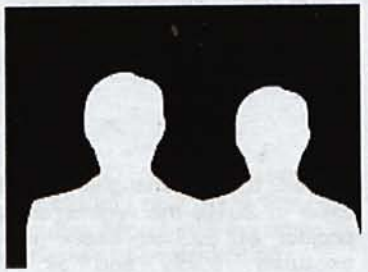
M.Arch Harvard GSD

Associate Professor of
Tongji University
(Dept. of Architecture)

刘宇扬
Yuyang Liu

M.Arch Harvard GSD.

Founder of Atelier Liu
Yuyang Architects



周保华
Frank P.W. Chow

Founder of FRC Design Ltd.
Former EDAW (Asia) Chief Designer

Focus:
Integrated Landscape Approach

Peter

Exchange Student from USA

Mr. Wong

Owner and resident of traditional settlement (Lilong)

Mr. Yuang

Local residents in the Suzhou creek precinct

## Commentary

Thanks to the Shanghai World Expo in 2010, the regeneration project of Suzhou Creek was executed rapidly and all of works among various districts along Suzhou Creek were planned and considered in higher degree of coordination. Compared with other two cases, Cheonggyecheon in Seoul and Malacca River in Malacca, Suzhou Creek is much longer and wider. The diversification of urban fabric and riverfront treatment is undoubtedly richer. There are several existing design approaches applied on different intervals of the river (16.5 km). Via studying of the configuration of those riverfront designs and the human activities in the river precinct, I would like to find out whether the various scenarios at the regenerated riverfront areas could really fit into the demands from different societies and end-users. Fortunately, few parts of riverfront interface have been retained; even though it would be reconstructed soon as tons of re-construction and refine works are being carried out.

Retain the diversification of communities in the river precinct

Next to the Suzhou Creek, it is observed that the new and the old settlement could interweave harmonically. This coexistence is mutually beneficial to both old and new as it causes the diversification of program and spaces. The most difficult part in

linking up the old and new would be the linked policy issue. Via gentrification at the city centre areas, low working class was forced to move to the city edge. Shacks, as the partial traditional early settlement near the Suzhou Creek that reflected the original living style is suggested to be retained. Lilong, including the marketplaces and some vital nodes should also be preserved to maintain the neighborhood network. Industrial buildings along the river side could be regenerated into new uses, such as artist workshops, studio villages, and museum for tourists. Other than this, more programs of other nature, such as restaurants, retail shops and other cultural events could be proposed. This coexistence of the old and new could then give a buffer period, slowing down the progress of gentrification.

Re-arrange and Re-configure public spaces in the river precinct

Regarding the regenerated riverfront public space along the Suzhou Creek, the amount of usage is not really high. On the other hand, some public places which are a bit far away from the riverbank would be occupied by quite a lot people.

One of the reasons may be that the current riverfront design for the Suzhou Creek is mainly copied from the western urban riverfront design style, Some open spaces along the riverfront do not really facilitate the local residential. Besides, the existing riverfront design is designed mainly for the elderly and tourists, but few for the youth.

In order to enhance the usage of riverfront area, we should investigate the variety of local human activities held in the public space in the river precinct and its relative spatial quality. Then, we could find out whether it's possible or not to configure the similar space along the riverfront area and thus more people would more often access to the riverfront.

Strengthen the linkage in-between riversides

Since the width of the river a bit long, the visual connection in between two riverside is innately low. The same problem is still presented in the regenerated condition. The low visual connectivity may eventually discourage the use of the public spaces along the river because of the large contrast of urban condition along both sides of the river.

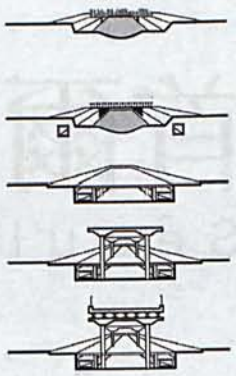
Strengthen the linkage from inland to the riverbank

River crossing points are thought to be the highest navigation point on the river, thus being places of significances. Water in cities, being important in today's society, can remind historic memories of the cities to their people. As the river crossing points are places and nodes that give emphasis to the city's memories within the urban fabric, more nodes, as places of significances could be created, together with the readjustment of the program along the city.

Spatial sequence from the inland to the riverbank would be another important factor to be considered. Building elevation, new programs, and a series of pocket public spaces could be added to attract more people to the river spaces.

# 首爾 清溪川

Seoul Cheonggyecheon



SEOUL

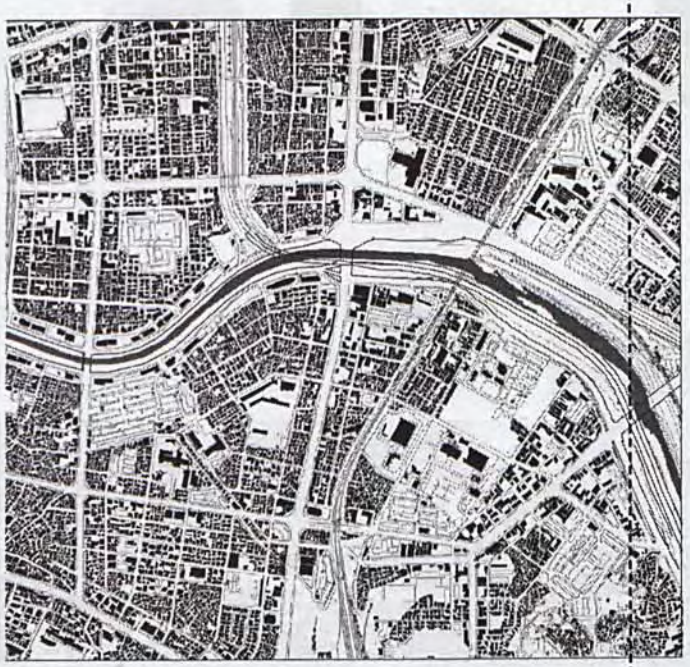
Urban Area: 605.25 sq km (0.6% of the entire country)
Population: 10,464,051 ppl (2009)
Density: 17,288/km2 (44,775.7/sq mi)
Parkland: 130km2

CHEONGGYECHEON

Length of river: 10.92km (5.84km restorted)
Width of river: 20-110m
Depath of river: 400mm (average)

Water quality: better than the 2nd grade
Water supply plan: 120,000ton/day (from Han river)
22,000ton/day (underground water from subway station)

02 Urban Waterway . Cheonggyecheon, Seoul . Programme Zoning Analysis



Zone 4

**Zone 1** **COMMERCIAL, ENTERTAINMENT, CULTURAL ZONE**
Myeong-dong, Seorin-dong, Gwancheol-dong, Supyo-dong

- Urban fibre ratio
- Public / Private Greenery ratio
- Residential area ratio

**Zone 2** **RAW-MATERIAL RETAIL ZONE & FASHION MARKETPLACE ZONE**
Dongdaemum Fashion Down, Sallim-dong, Bangsan-done,

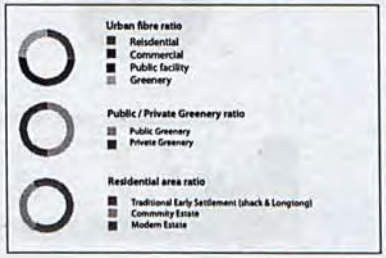
- Urban fibre ratio
- Public / Private Greenery ratio
- Residential area ratio

**Zone 3** **RAW-MATERIAL RETAIL ZONE**
Cheonggye 7(chil)-ga, Hwanghak-dong, Jongno-gu

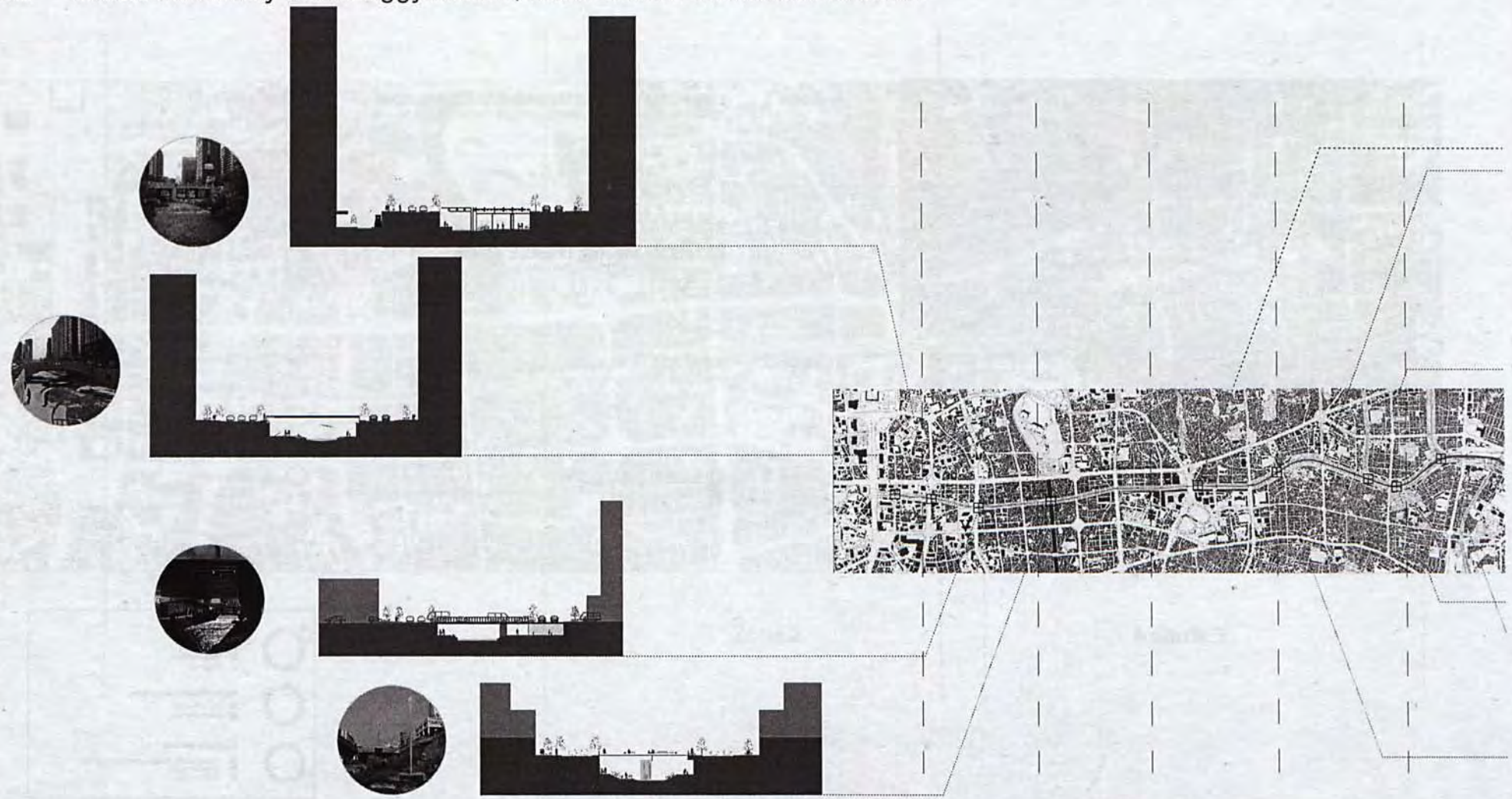
- Urban fibre ratio
- Public / Private Greenery ratio
- Residential area ratio

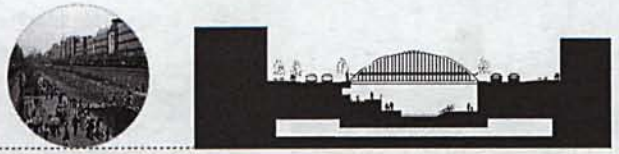
**Zone 4** **RESIDENTIAL ZONE**
Seongdong-gu, Dongdaemun-gu, Majang-dong, Jeongneungcheon(stream)

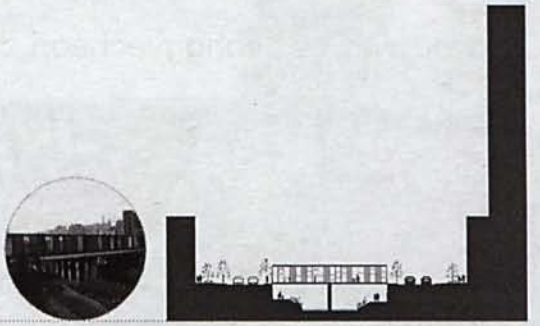
- Urban fibre ratio
- Public / Private Greenery ratio
- Residential area ratio

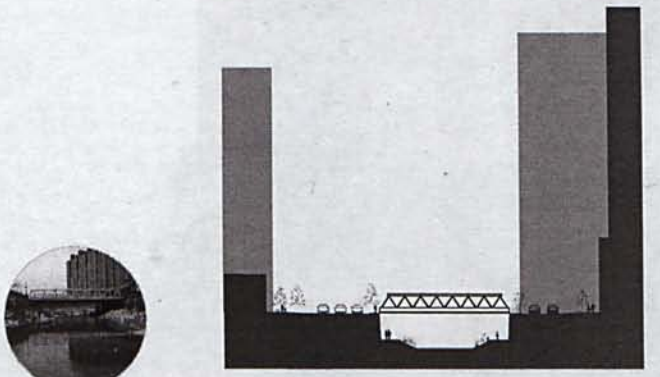


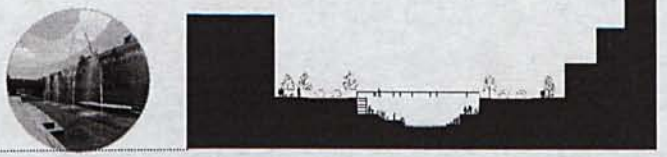
02 Urban Waterway . Cheonggyecheon, Seoul . Riverfront Interface condition

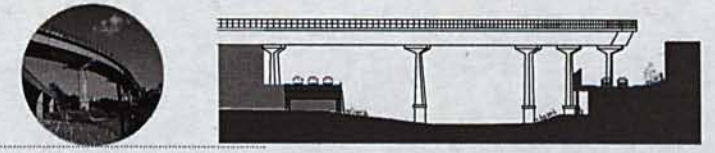












## 02 Urban Waterway . Cheonggyecheon, Seoul . Riverfront Interface condition

Interface Condition

Semi-indoor space introduced to the bridge and

Activities

exhibition, gallery

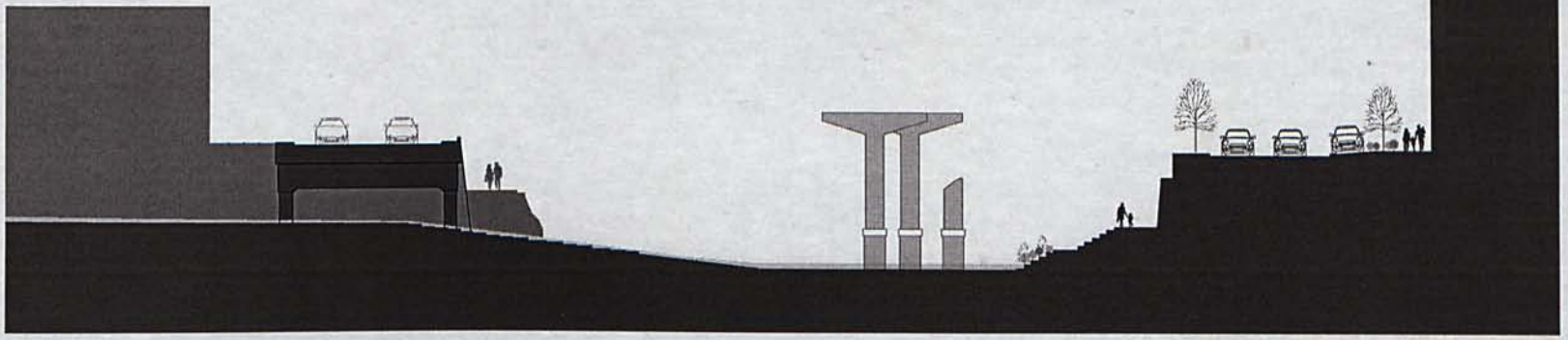
## 02 Urban Waterway . Cheonggyecheon, Seoul . Riverfront Interface condition

### Interface Condition

Wide riverbank with ruins

### Activities

Leisure use and sightseeing spot



## 02 Urban Waterway . Cheonggyecheon, Seoul . Riverfront Interface condition

### Interface Condition

Pathways arranged at the both sides of the river

### Activities

Circulation with river access point

## 02 Urban Waterway . Cheonggyecheon, Seoul . Riverfront Interface condition

### Interface Condition

A bridge equipped with waterfall

### Activities

Leisure use

# 02 Urban Waterway . Cheonggyecheon, Seoul . Riverfront Interface condition

## Interface Condition

Extra platform equipped with water pond

## Activities

Leisure area, gathering space, dabbling

## 02 Urban Waterway . Cheonggyecheon, Seoul . Riverfront Interface condition

### Interface Condition

Multi- level with water pond on the upper level

### Activities

Leisure area, gathering space.

## 02 Urban Waterway . Cheonggyecheon, Seoul . Riverfront Interface condition

### Interface Condition

Sandbank and river interchange point

### Activities

Leisure use, bird watching




## 02 Urban Waterway : Cheonggyecheon, Seoul . Riverfront Interface condition

### Interface Condition

pathway and a open area underneath the historical stone bridge

### Activities

Leisure use, sightseeing

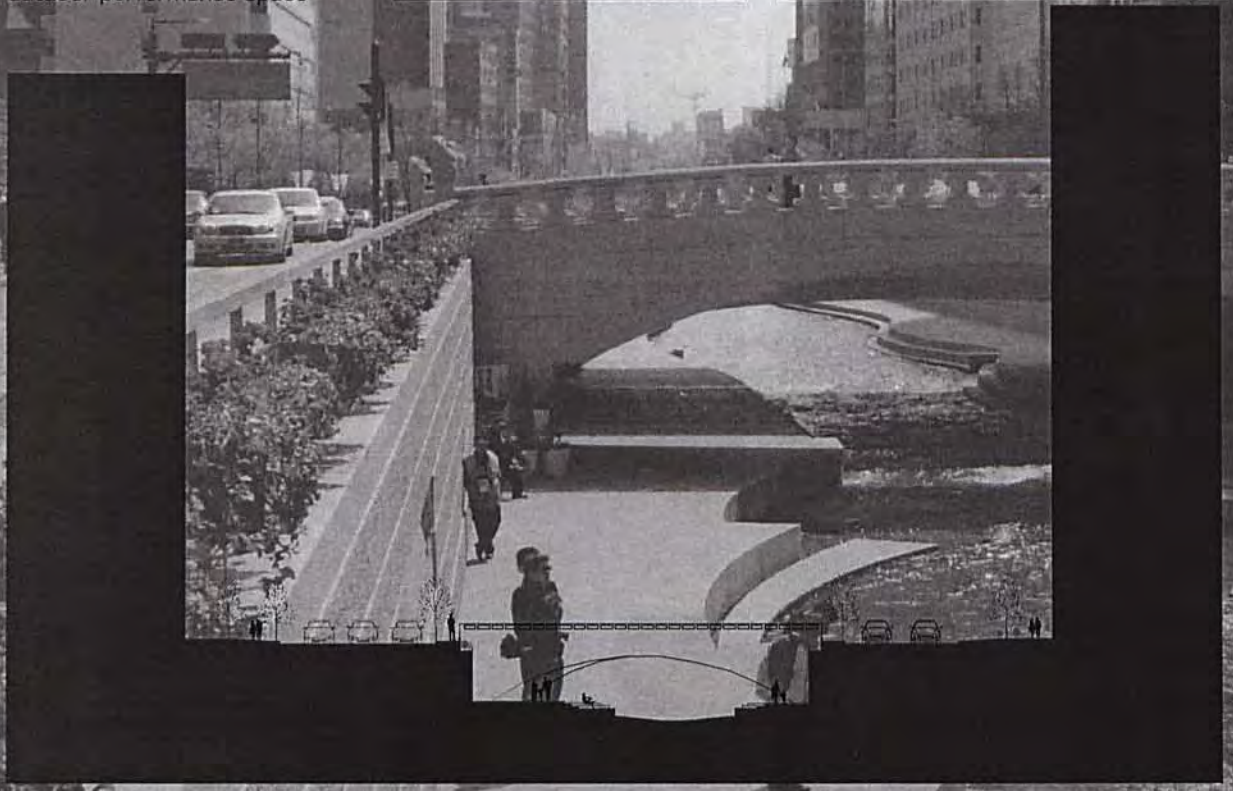
## 02 Urban Waterway . Cheonggyecheon, Seoul . Riverfront interface condition

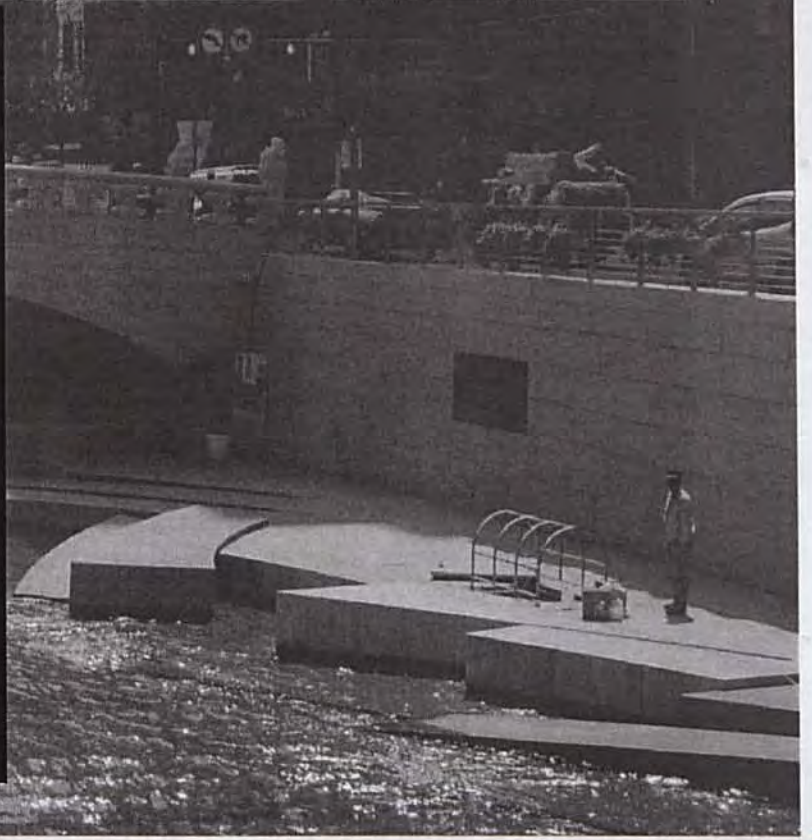
### Interface Condition

A wide platform formed at one side of the riverbank and a pth-way on another side

### Activities

Leisure use,
outdoor performance space





## 02 Urban Waterway : Cheonggyecheon, Seoul . Riverfront Interface condition

### Interface Condition

A Recessed large open space connected to the pathway underneath the bridge

### Activities

exhibition, gallery, gathering

# 02 Urban Waterway . Cheonggyecheon, Seoul . Human acivities in river precinct

## Leisure Activities


Plaza in a city park in river precinct with minimal usage.


Pocket open space in the commercial district


Pocket open space in the residential area

## Recreational Activities


bricycle route along the rievr


A courtyard open space in the renovated historical building for cultural event

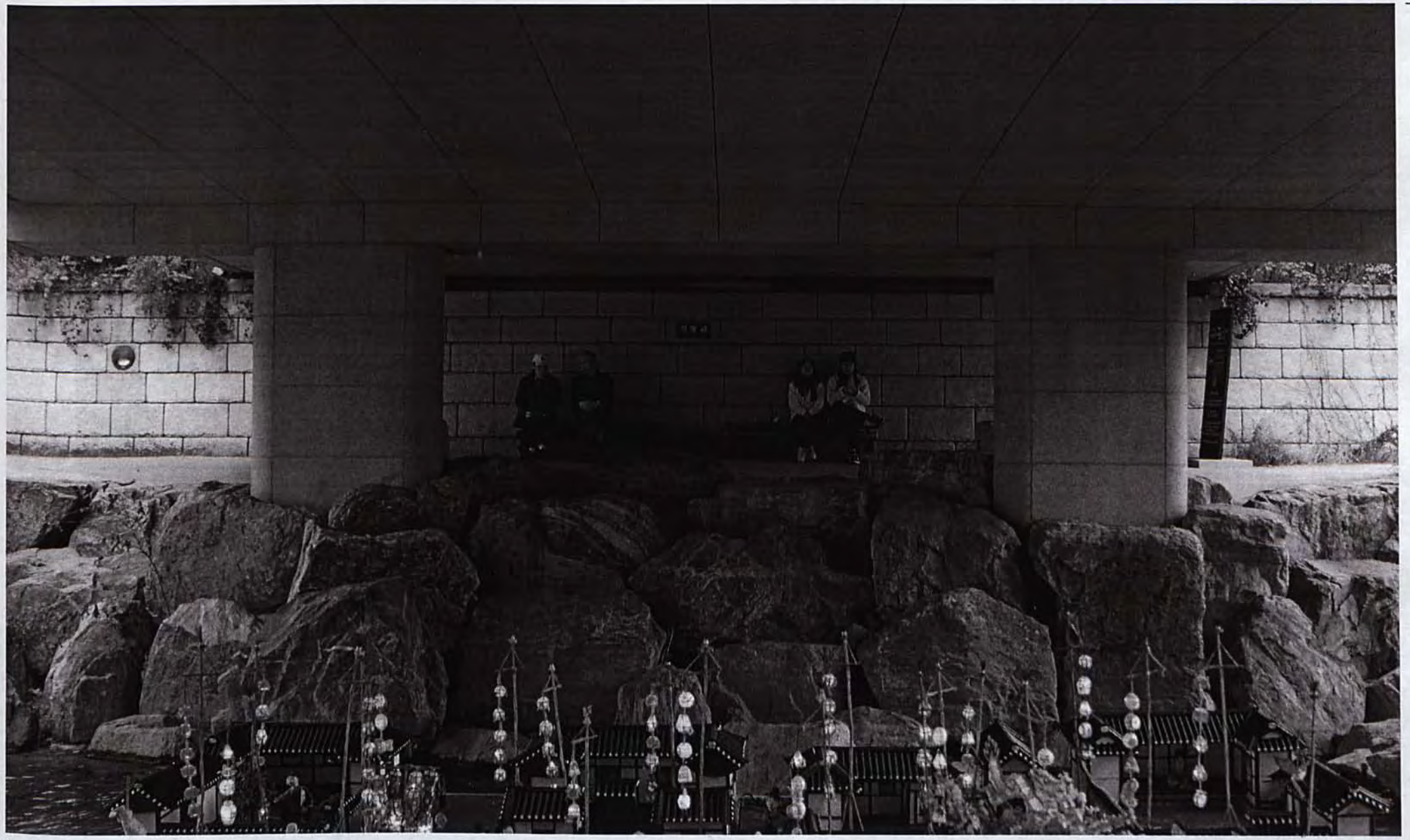

Adaptive reuse of historical buildings transformed to underground gallery spaces

## Commercial activities


Underground shopping street


Street frontage occupied by street vendors


Marketplace with basement for artist studio working space



**신해원**
Shin Haewon

AA Dipl. BSc.
Founder of Lokaldesign,
Korea

Projects:
Han River Renaissance
Pedestrian Tunnel
Design

**최상기**
Choe, Sanki

M.Arch. GSD.
Assisant Professor of
Univerisyt of Seoul

**최상기**
Changhi Yun

AA M.Arch.

CEO of
Kyungam Architects
Associates Ltd.

Projects
Floating Architecture

**나병국**
Byeong-kuk Na

M.March.
Korean National
University of Arts

Practicing
Architectural Assistant

**Esther Juhye Chung**

B.Arch MIT

Practicing
Architectural Assistant

## Commentary

Promptly upgrade of city image

Reopening up the river to the public and redesigning the riverbank area attract people usage and install energy to the city. Before the regeneration, the river was covered by a devastating highway and the public could not access the water. After the regeneration, more cultural events and community activities, such as the artistic works exhibition and the lantern festival, can be held at numerous renovated spaces along the river now. Through these activities and exhibitions of heritages and historical artworks, the river is being turned into a place that reviews their city development history and the local cultural.

New public domain in the high dense city

Regeneration of the River provides new public domain in the high dense city centre. Around the river precinct and also the city centre, pubic open spaces and greenery had been lacking in the past. However, such are especially essential in the indeed high dense city. The urban river, as city asset, acquires no extra charge for the land price. It could be transformed from a mullah to a public park, a valuable piece of nature in the city. The river is also now the only public place completely passes through the whole city center. People can experience the different of urban fabrics, walking from the commercial district to the residential district and then finally the natural environment, to the city park. It also attracts citizens who live in the city edge or suburb to access to the city especially in summer time.

Dynamic riverbank design

Numerous scenarios are being created along 5.85km long restored riverbank area. Various amenities, such as pond, waterfall, fountain, multi-level decking, sculpture, bridge, ramp, staircases, historical artworks, monuments, and sport facilities, merged with the flowing water provides a rare natural environment that generate different sightseeing spots and scenarios in the city centre. Waterscape, such as sandbank, fountains, waterfall, and landscape, such as wetland, recessed underground space, swamp, aquatic plants, combine to give harmony environment composing of both artificial and natural elements. It also gives the vibrant experience of waterscape, such as static, rippling, flowing, when people walking along the river.

Awareness of sustainable city development

Previously as bunches of highways, the environmental quality of the river precinct was undesirable. Polluted environment and crowded traffic not only

reduce the attractiveness of the city center, but also gave adverse influence to the sustainability of the city. Restoring the river has successfully reduced the temperature in the city center by 2-3 oC. This reduction has raised more society's concern on the importance of the balance between the natural ecology and the city development.

Facilitation of human circulation

Since there is a pedestrian walkway through the whole watercourse, the local citizens could use it as an expressway passing through the city centre. Traffic congestion occurs every day in city center, especially during the lunch hour. People can take the walkway along the river as an efficient passage during the rush hours. Collaboration of bicycle network to the riverfront design could provide another choice of movement. The well integration of traffic of different speed could make fluent the people movement and enhance people usage of the river public spaces.

Segregation from the surrounding urban context

As the level difference between the street level and the sunken riverbank level almost ranges from 3.5m to 6m, the river activities are visually disconnected to the surrounding. The level difference makes it difficult for the pedestrian to notice the river location even walking around in the river precinct.
Besides the visual separation caused by the level difference, pedestrians cannot access the riverbank easily. The one way motorway at the both riverside on the street level blocked the accessibility to the river. Entrances, ramps or staircases leading to the river level are few and at only one side. The river does not connect to the existing underground shopping street which could be a potential linkage that draws people to the river spaces.

Nearsightedness:
incomprehensive urban
Overlook the local neighborhoods in the river precinct

The River now becomes a more attractive place to stay and to live. This triggers the gentrification. The existing material retail shop owners and the residents of the traditional early settlement are forced to move out as the land price keep continuously increased and they do not have any bargaining power. However, the social groups living in original settlement has established social network and activities circles around the river and shall be preserved to maintain the vitality of the precinct.
High-end new mega residential estates are going to invade the river side. The huge podium and the indeed high sectional profile are incompatible with the width of the river. The narrow sunken water bank and the high sectional profile of the new residential skyscraper would worsen the spatial quality of the riverfront area due to a sense of oppression.



# 馬六甲 河

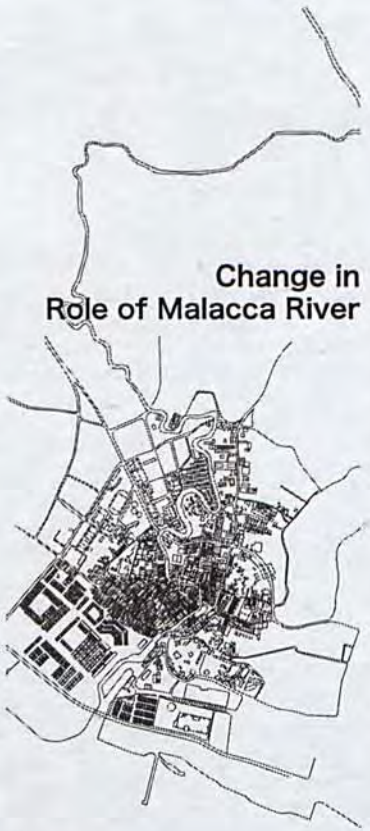
Malaaca River

CETRAL MALACCA

Urban Area: 304.29 sq km
Population: 473,700 ppl (2009)
Density: 1556.74/km2 (4,031.9/sq mi)

MALACCA RIVER

Length of river: ~10km restorted
Width of river: 15-35m
Depath of river: 1500mm (average)



# Change in Role of Malacca River

**Conduit for trade** (past)

By the end of the 15th century, due to the geographic advantage, Malacca was an essential port for the trading network within Middle East, India, Europe, Africa and China. And thus, it became a target for occupancy of many European countries like Portugal, British and the Dutch. Being an indispensable conduit for trading, it didn't only act as a transfer post, but also a catalyst for the local industries development. Due to the rich natural resources, a large amount of raw material and agricultural products after manufactured in the local industries were exported to the world.

To maintain this economy framework, Malacca river would be a main structure in the urban context as the waterway to access to the inland area provides a perfect way for the local goods delivery. So, Malacca river was regarded as the core and economy center of the Malacca old town.

Therefore, many places along the riverfront were occupied by the industries, otherwise, it would also be occupied by the shophouses which generally were equipped a godown or warehouse facing to the river. The river at that time was highly loaded as numerous boats were packed along the river for the transport or goods loading and tons of sewage or pollutants were discharged into it. In the local citizens' mindset, the riverfront area was highly polluted and perceived as a conduit for trading activities and the sewage works at the back of the shophouse. None of them would imagine the river could be a leisure area as the river at that time acts like an artificial canal and the private backyard of the riverside buildings instead of a natural stream flowing through the city.

**Conduit for tourism** (now)

Regarding the advance in land and air transport system, the trading activities along the waterway began to reduce and some factories were already moved into the inland of the city, which triggered a paradigm shift in the role of river in the developing urban context. The river was not be a transport route and a septic tank of the city any more, it was restored with concrete pedestrian walk or elevated wooden deck as a new public domain and the most popular sightseeing spot in Malacca old town.

In the past, the riverfront area was fully occupied by the factories

for the loading activity and most of them were not opened to pubic. Although the residential units and the remaining factories mostly do belongs to the individual properties, thanks to the Government dredged the riverbank and introduce the pedestrian walkway adjacent to the existing buildings in the river precinct. Now, a continuous 10km long promenade was designed along the Malacca river in the old town area and then people could easily access to the riverfront area. To encourage the people to use those new public area, the river water quality was highly improved by the re-direction of existing sewage drainage and introduction of new water filtration plants and various landscape designs were done to create difficult scenario of public spaces for both tourists and the local habitants.

Because of the rehabilitation of Malacca river and the repute of being World heritage, the tourism has been highly developed. Thus, the commercial activities including restaurants, hotels, retail shops, bars, trishaws and the river cruise have been rapidly vitalized. And, Malacca is already a popular place for weekend vacation of Singaporean and Malaysian.

**Conduit for education** (future)

Concerning the rich multiple cultural heritage along Malacca River, there are much potential to develop an educational route for Malacca history, culture and the natural ecology in Malacca old town. Within only 3 km long waterway, the historical resource, cultural resource and the natural resource like the mangrove are pretty rich and intensive. While strolling along Malacca River, you could experience different scenarios including the Chinese Town, Malay Village, St. Paul hill, River Park and the mangrove.

In fact, Malacca River ideally could be the main axis as the main structure for the educational route. The river's linear form creates a shortcut (longitudinal direction) for tourists or students to capture a rough impression of the Malacca old town. If you want to get more detail understanding in any aspects of the historical town, you could just walk a bit into the inland from the river, various buildings, human activities and culture would already be shown in front of you. Therefore, it's essential to strengthen the linkage from the riverfront to the inland, and some educational centre should be built along the riverfront as check points within the educational route. Therefore, as a historical heritage Malacca not only could serve the tourists as a sightseeing spot and World heritage, but also acts as a living museum and an educational centre to provide routes for the young generation to experience and learn about the colonial history and multi-culture in Malacca.

02 Urban Waterway . Cheonggyecheon, Seoul . Programme Zoning Analysis


Malacca River
and Straits of Malacca

Historical Core Zone

Historical Buffer Zone

**Zone 1** **TOURISM ZONE**
riverside hotel cluster, river cruise station,
hillside historical buildings cluster

- Urban fibre ratio
- Public / Private Greenery ratio
- Residential area ratio

**Zone 2** **CULTRAL ZONE**
Jonker street, Heeren street, The Stadthuys, Chinatown, Jalan Tokong

- Urban fibre ratio
- Public / Private Greenery ratio
- Residential area ratio

**Zone 3** **COMMERICAL ZONE**
Jalan Bunga Raya, Jalan Kee Ann, Jalan Baru, Jalan Kampung Hulu
Chinese methodist church

- Urban fibre ratio
- Public / Private Greenery ratio
- Residential area ratio

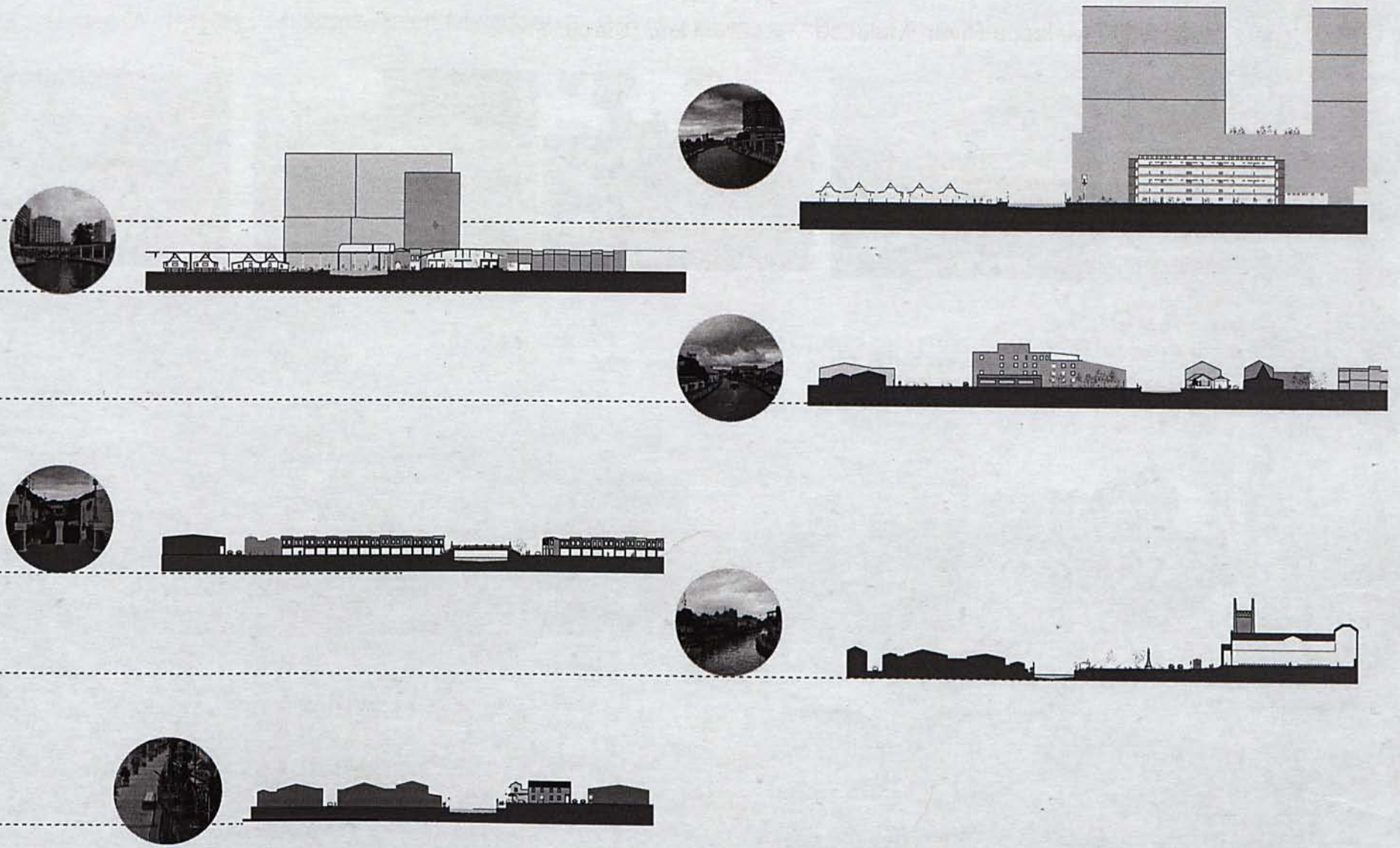
**Zone 4** **COMMERICAL ZONE with many public facilities**
Plaza Hang Tuah, Jalan Bendahara, KMA digital mall
Stadium Hang Tuah, district office, Southern Hospital

- Urban fibre ratio
- Public / Private Greenery ratio
- Residential area ratio

**Zone 5** **RESIDENTIAL ZONE**
Malay village, Tun Lanang flats

- Urban fibre ratio
- Public / Private Greenery ratio
- Residential area ratio

## 02 Urban Waterway . Malacca River v. Riverfront Interface condition



# 02 Urban Waterway . Malacca River, Malacca . Riverfront Interface condition

## Interface Condition

Left: parking lot
Right: historical buildings cluster

## Activities

Leisure use
sighseeting spot

## Weak linkage to the riverfront

The Stadthuys is a landmark in the Malacca old town, and this historical building cluster including the square, clock tower etc. was built at that area as concerning the natural topography like the hill & the river and the urban development in the past. Yet, the sense of connection in between the cluster and the Malacca river is indeed weak nowadays.

small open space
with sidewalk snack booth

small open space
with sidewalk snack booth

The Stadthuys

# 02 Urban Waterway . Malacca River, Malacca . Riverfront Interface condition

## Interface Condition

Left: Promenade
Right: Promenade with cafeteria area

## Activities

Leisure & sightseeing

## Multi- levels platform along riverfront

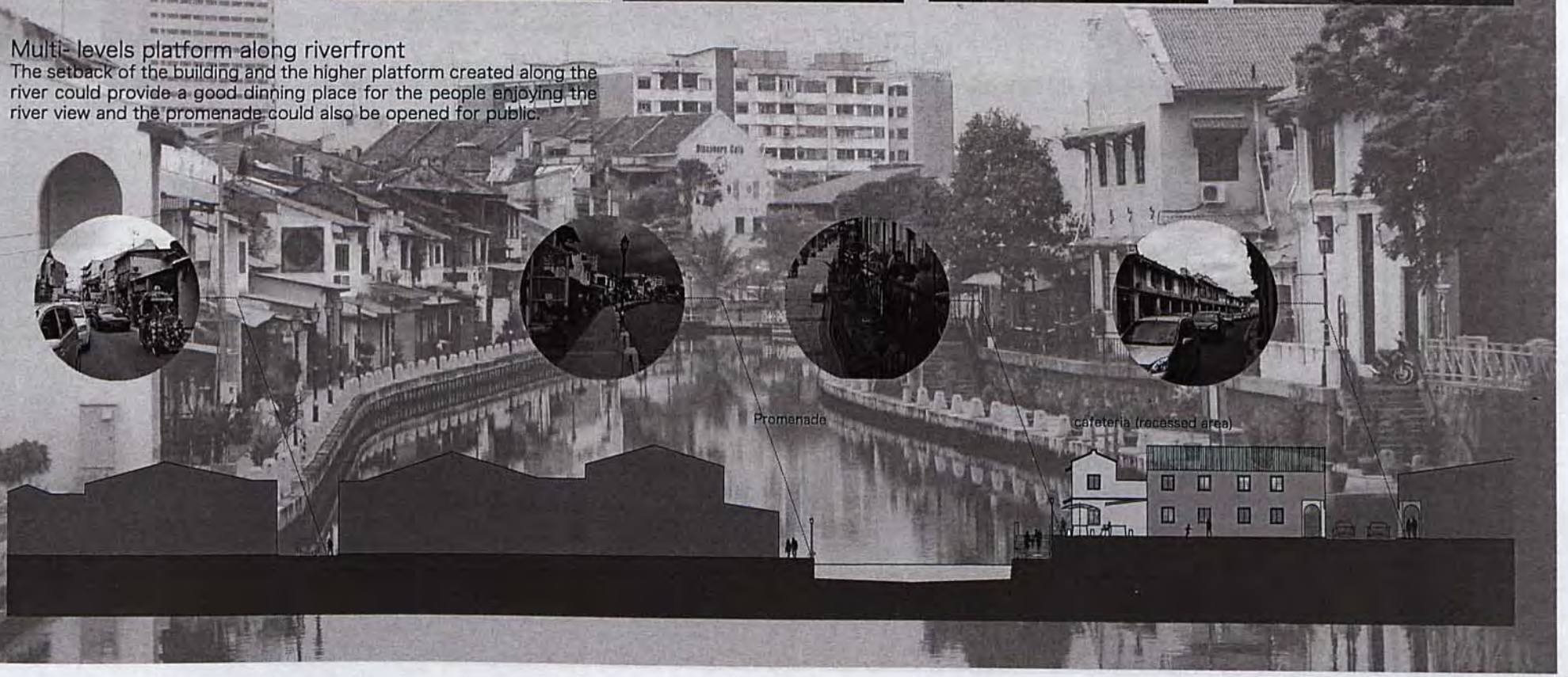
The setback of the building and the higher platform created along the river could provide a good dinning place for the people enjoying the river view and the promenade could also be opened for public.











# 02 Urban Waterway . Malacca River, Malacca . Riverfront Interface condition

## Interface Condition

Left: Promenade with few cafeterias
Right: Parking lot Church




## Activities

exhibition, gallery, gathering

## Riverside buildign frontage

The restaurants or hostels in the riversides shophouses began to open up their rear part to the riverside. They would create a second buildign frontage along the riverfront area. Due to this change, the interior layout of the shophouse would be changed as some of them already provide a cafeteria area at the riverfront. Yet, whether the current promenade design could fit into this new demand for the riverfront space should be concerned and further considered.

## Disconnection form the monument to the river

A large parking lot is located in between the St. Francis Xavier's Church and the Malacca River. The parking lot and the heavy traffic motorway in front of the church weaken the connection of the church to the riverfront leisure area. The church would attract certain amount of peoples to gather around, if the parking lot could be modifies as a public space and the motorway could be relocated, it would be a nice large public space for cultural events.



shophouse
promenade with few cateria area
promenade
parking lot
motorway
St. Francis Xavier's Church

# 02 Urban Waterway . Malacca River, Malacca . Riverfront Interface condition

## Interface Condition

Left: shopping street
Right: shopping street
worship place

## Activities

Leisure use, shopping, sightseeing, praying

### Narrowness of street as a transverse linkage to the river

The similar narrow shopping streets on both riversides create an interesting dramatic experience for the people to access to the river. The narrowness of the street creates a strong lighting contrast and a sense of tunnel. The bridge acts as a highlighted spot on the street to open up the whole view for the restored river. It could reveal the commercial activities and private residences along the river in the past, and the narrowness feature of Malacca old town street.

### Proper riverside worship place

The conserved semi-outdoor worship place could reveal the worship culture of the Chinese towards the waterway or sea. This kind of cultural heritage should be highly protected to be a part of human landscape in the river precinct.

shophouse (retail shop)

worship place

shophouse (residential)

# 02 Urban Waterway . Malacca River, Malacca . Riverfront Interface condition

## Interface Condition

Left: wooden deck promenade
abandoned land lot
Chinese temple

Right: Islamic school guidance
riverfront piazza




## Activities

Leisure use, gathering,
sightseeing, religious ceremony

## Weak Linkage to the riverfront

The disconnection form the riverfront promenade to the inland part should be avoid. Actually, the abandoned land lot should be restorted as a new public greenery and the open to the riverfront area. Besides, the Chinese temple could further strengthen the visual connection to the riverfront and attract people to gather around.

## Islamic school guidance as a living museum

The riverfront piazza could provide a nice space for cultural event and gathering. And the Islamic school nearby the riverfront could let the tourists to experience more about the Islamic religious culture as you could see the people praying while strolling along the promenade.

# 02 Urban Waterway . Malacca River, Malacca . Riverfront Interface condition

## Interface Condition

Left: Promenade
Right: Detached walkway

## Activities

Leisure use

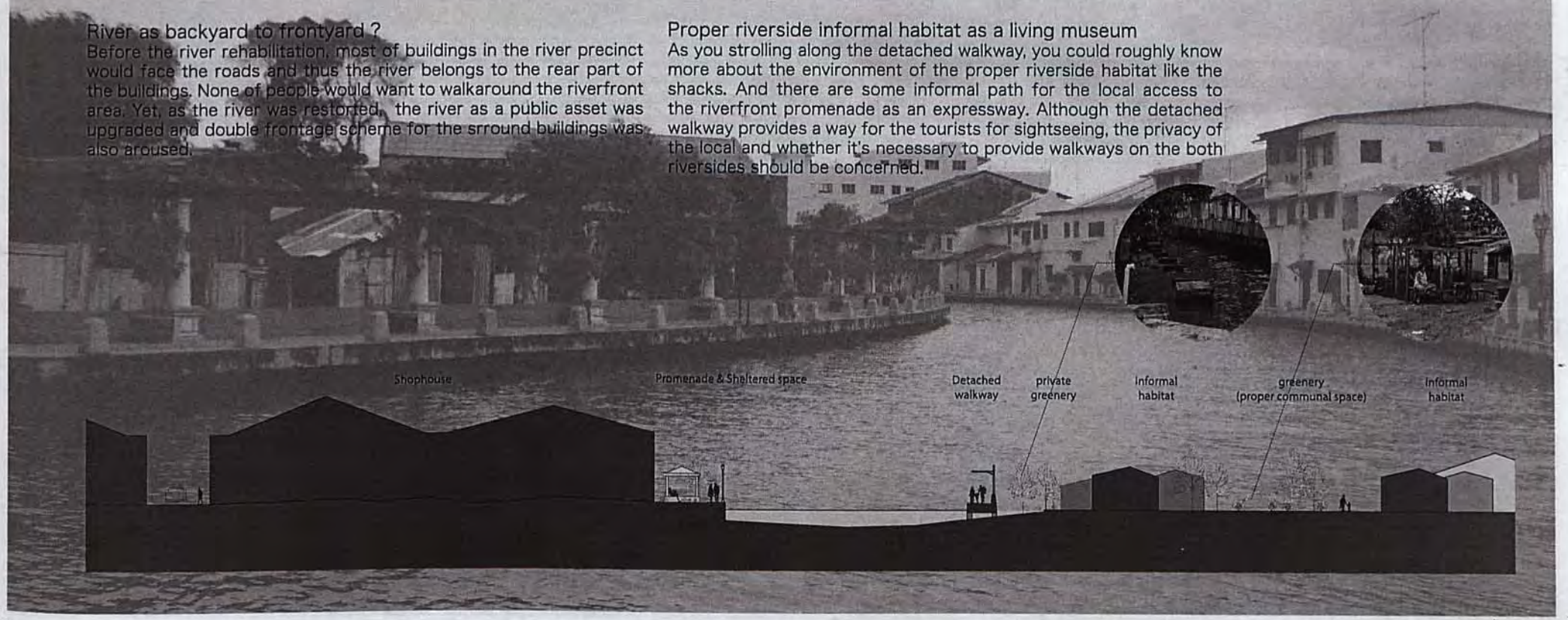



### River as backyard to frontyard ?

Before the river rehabilitation, most of buildings in the river precinct would face the roads and thus the river belongs to the rear part of the buildings. None of people would want to walkaround the riverfront area. Yet, as the river was restorted, the river as a public asset was upgraded and double frontage scheme for the srround buildings was also aroused.

### Proper riverside informal habitat as a living museum

As you strolling along the detached walkway, you could roughly know more about the environment of the proper riverside habitat like the shacks. And there are some informal path for the local access to the riverfront promenade as an expressway. Although the detached walkway provides a way for the tourists for sightseeing, the privacy of the local and whether it's necessary to provide walkways on the both riversides should be concerned.



# 02 Urban Waterway . Malacca River, Malacca . Riverfront Interface condition

## Interface Condition

Left: Private riverside park
Right: Pocket open public space

## Activities

Circulation with river access point

## Local public domain

Within the surrounding area, quite a lot of Indian people would gather around in daytime and nighttime also. And, due to the restaurant nearby, certain amount of the people would pass by the promenade. The open space in pocket size could provide a suitable area for the local to gather around.

## Private Park as a landmark

The Ferris wheel situated along the riverfront not only attract people to walk around there and is a landmark in the river precinct. Although entry fee would be required for the private river park, there are still some local people would be willing to pay to enjoy the leisure area in the park especially in nighttime.

Commercial use
(e.g. Retail & hotel)

Private River Park

Pocket public space

Commercial use

# 02 Urban Waterway . Malacca River, Malacca . Riverfront Interface condition

## Interface Condition

Left: outdoor sidewalk snack booth
Right: elevated sidewalk on the wetland and elevated monorail









## Activities

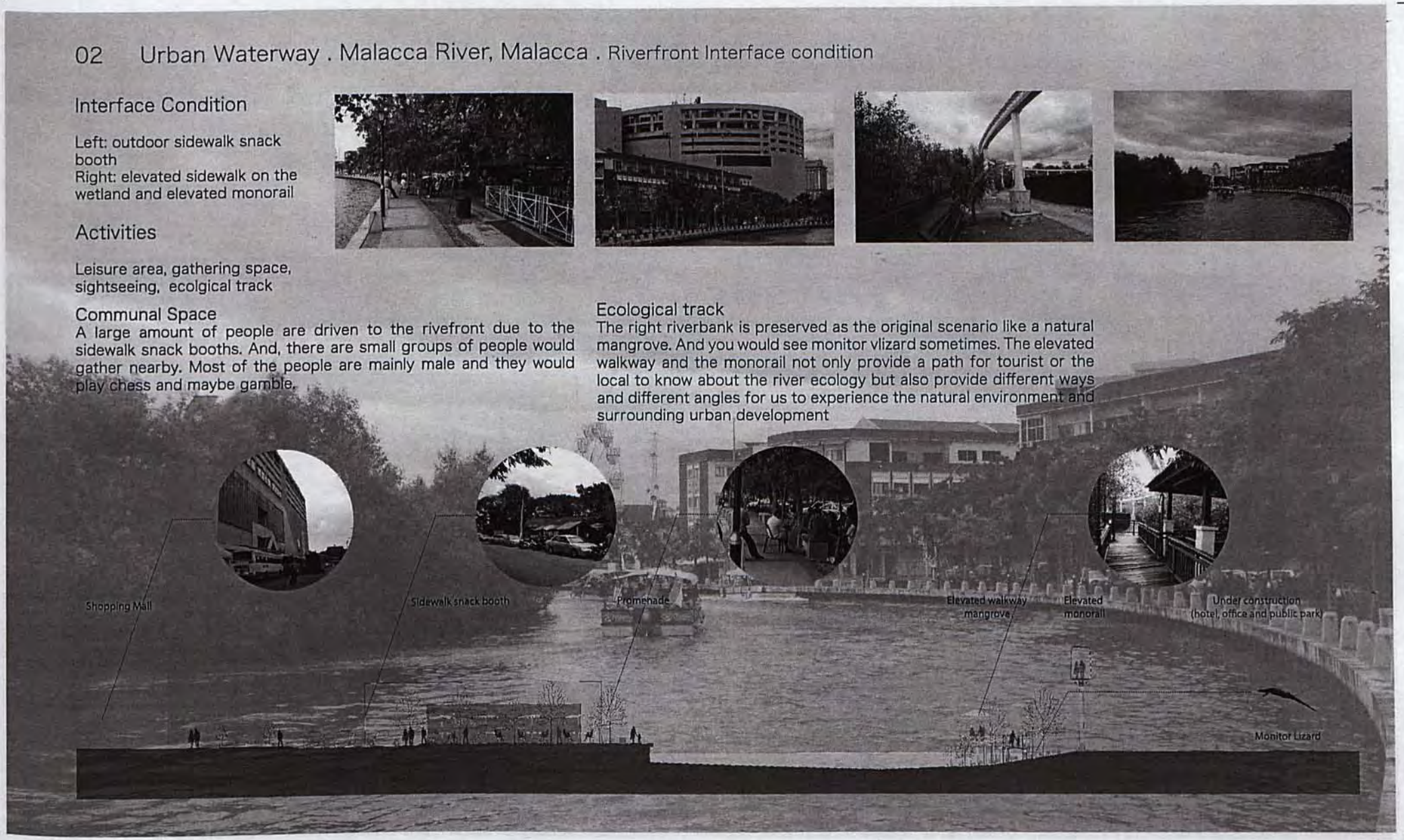
Leisure area, gathering space, sightseeing, ecolgical track

### Communal Space

A large amount of people are driven to the rivefront due to the sidewalk snack booths. And, there are small groups of people would gather nearby. Most of the people are mainly male and they would play chess and maybe gamble.

### Ecological track

The right riverbank is preserved as the original scenario like a natural mangrove. And you would see monitor vlizard sometimes. The elevated walkway and the monorail not only provide a path for tourist or the local to know about the river ecology but also provide different ways and different angles for us to experience the natural environment and surrounding urban development



# 02 Urban Waterway . Malacca River, Malacca . Riverfront Interface condition

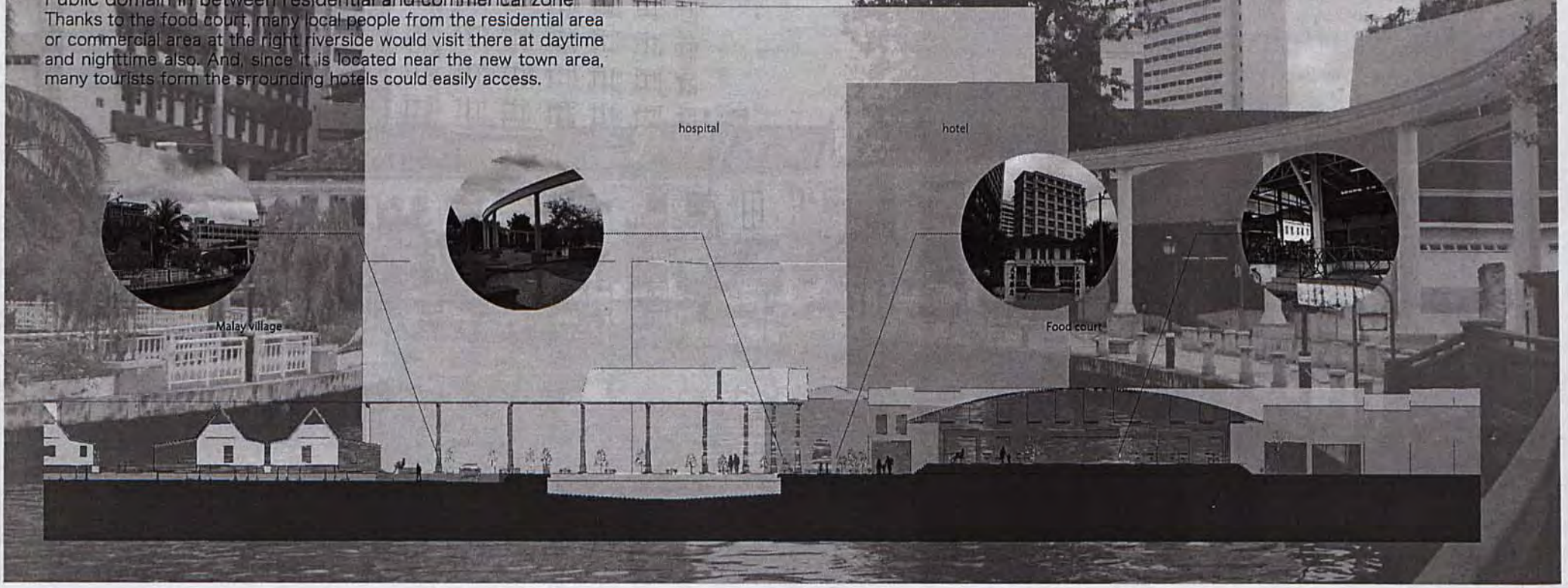
## Interface Condition

Left: traditional Malay village
Right: riverside plaza
sheltered food court

## Activities

Leisure use, sightseeing, dinning

Public domain in between residential and commerical zone
Thanks to the food court, many local people from the residential area or commercial area at the right riverside would visit there at daytime and nighttime also. And, since it is located near the new town area, many tourists form the srrounding hotels could easily access.



# 02 Urban Waterway . Malacca River, Malacca . Riverfront Interface condition

## Interface Condition

Left: traditional Malay village
Right: modern housing estate
huge hotel building




## Activities

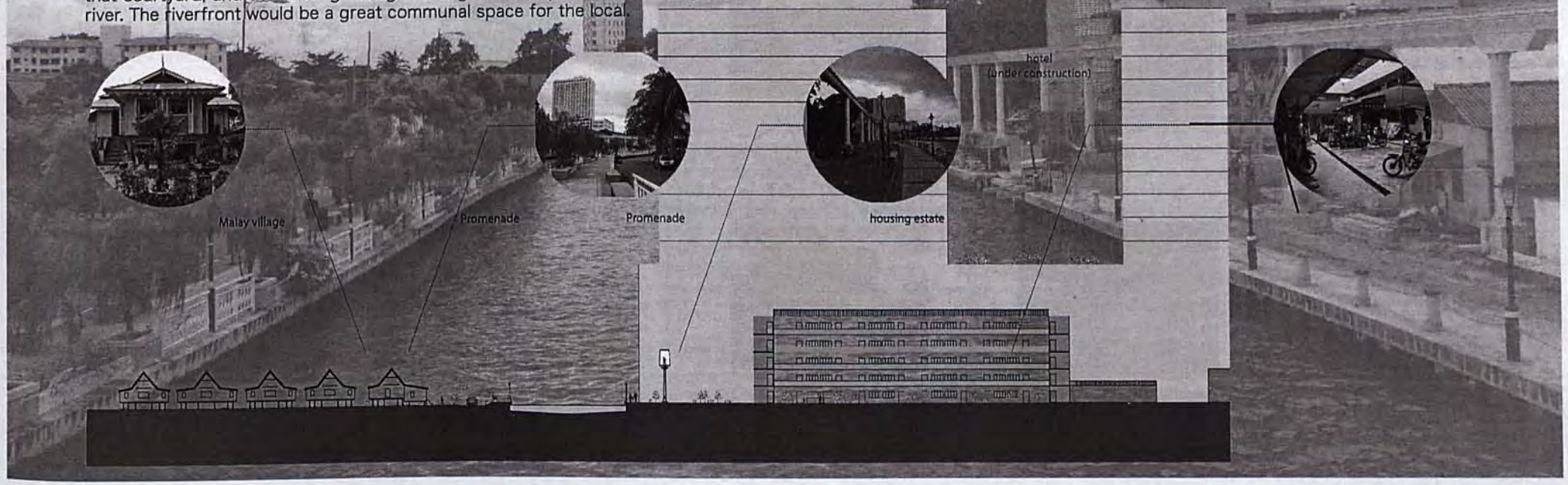
Leisure use, bird watching

## Old & New housing units

Even though the traditional and modern housings are located along the riverside, the modern housing estate is relatively introverted. The interior courtyard is totally enclosed and mainly used for storage rather than communal space. If the riverfront area could be linked to that courtyard, and the bulding design have greater respone to the river. The riverfront would be a great communal space for the local.

## Mega building block

As the Malacca river has been rehabilitated, outsides the buffer zone , there are numerous construction sites, and some of them would be transformed for the commerical use like hotel or commerical buildings. Yet, the building size and the plot ration is relatively indeed huge. If there are that high mega block buildings are built at the both riversides, the tunnel effect may be caused and the river view would be degraded.



# 02 Urban Waterway . Cheonggyecheon, Seoul . Human acivities in river precinct

## Leisure Activities

Public square within the historical buildign cluster


Sidewalk snack booth and pocket open space along riverfront. Mainly Indian gather around. Mainly male adults would gather around in daytime and the female adults and children at evening time.


Riversides pocket open space. Mainly Indian people would stroll at this area.


Pocket open space in the informal habitat cluster


## Recreational / Cultural Activities


a piazza and the pier for the river cruise


A large outdoor performance space adjacent to the Jonker street.


Chinese temple 'Cheng Hoon Teng Temple'

## Commercial activities


Underground shopping street


Street frontage occupied by street vendors


Marketplace with basement for artist studio working space

# 02 Urban Waterway . Cheonggyecheon, Seoul . Human acivities in river precinct


Riversides pocket open space


A large piazza on the podium level of modern shopping mall


Pocket open space along the Jonker Street


Sidewalk snack booth at the backlane

## Instant climax of people flow during weekend & holiday

Due to the repute of the World heritage and low price level, not only the international traveller would be attracted to visit malacca, but also the people from Singapore and other cities in Malaysia would like to travel around in Malacca. Especially in weekend, lots of citizens from surrounding cities would rush to Malacca particularly the old town area. Hence, during weekend, the pedestrian market would be held along the Jonker street, all the pubic space would be fully occupied by the tourists and the locals. Yet, during the weekday, some open spaces would be totally unused.

undoubtedly, at the nighttimem, most of tourists are driven by the restaurants, pedestrian market and the bars in Malacca old. On the other hand, in the daytime, tourists would prefer to walk around the city to visit numerous historical buildings which are widely spreaded in the city.

## Intrusion of new mega shopping mall & large open space

As the Malacca had been rapidly developed recently, numerous shopping mall like Mahkota Parade and Dataran Pahlawan Megamall were built around 0.6km far away from the old town area. Most of the teenagers would prefer to walk around in the shopping mall instead of the traditional narrow shopping street. Shopping mall becomes their communal space. Thus, you seldom meet the local youth near the Malacca River. Besides, a large piazza on the shopping mall's podium level is really a new type of open space in the Malacca. The size of the piazza is nearly four times than the proper plaza in Malacca town, but its usage is indeed low. In order to facilitate the use of public space for the local citizens, further analysis has to be done.

**Wan Azhar Sulaiman**

UCL M.Arch.
Founder of CODA,
Malaysia

Paper:
Verandahways as catalysts for walking in a tropical city

**Abong Hafiz**

Architectural Designer,
Malacca

**MOHD. SAM**
**B. HJ. AHMAD**

Assistant Engineer
(Planning Project),
MBMB (Historic Melaka
City Counil)

Projects
Malacca River Rehabilita-
tion

**MOHD. SAM**
**B. HJ. AHMAD**

Assistant Engineer
(Planning Project),
MBMB (Historic Melaka
City Counil)

Projects
Malacca River Rehabilita-
tion

## Commentary

Malacca old town
as A living museum

Walking in the Malacca, countless historical treasures are widely distributed in the old town area. It's not rare as you could notice one of temples or churches after you just make a turn or straight ahead 100m further. Actually, in the old town area, up to the religious buildings down to the proper shophouse also have certina historical value. Apart from the urban fabric, the diversification of ethic groups causes various human activities and the programme including the retail shops, street vendors and the religious ceremonies also have valuable cultural value. Undoubtedly, Malacca town is just like a living museum. As you walk from the Malacca city center to its old town area, the experience is similar to walking via a time tunnel to review Malacca's 600 years history.

Due to the multiple ethnic cultures environment, different kinds of religious buildings such as temples, churches or mosques could be found everywhere in the town in which various communities like the Chinese, the Malaysian or the Indian would gather at relative sacred places. Along the Malacca River, you could be aware of the harmony of different communities occupying in the certain neighborhoods. And, with distinct ethic backgrounds, their living styles thus have certain difference. For instance, the Chinese have relatively interests on the outdoor leisure area as compared with the Indian and the Malaysian.

Habitable city scale

If the Malacca River is a central axis of the old town zone in the urban context, most of urban fabric including the marketplaces, the Dutch square, the St. Paul hill, churches etc in the zone could be accessed within just around 5mins. walking distance (~400m). This city scale could provide proper walking routes for the tourists to experience the city on foot. It's easy to walk through the whole town to understand the rough picture of town planning within one day. As the river was rehabilitated, it could be further promoted to be a new public domain which not only serves the local and tourist but also acts as a gateway for people to experience Malacca old town.

River Cruise as traffic backup

Regarding the incipient urban planning influenced by the Portuguese, the Dutch & the British, the road in between the rows of shophouses is intentionally planned for the carriages and the pedestrians. The rapid development in Malacca causes a huge quantity of vehicles and tourists. The initial urban design could not applicable to that heavy traffic and thus the

overloaded traffic network leads serious traffic jam especially in the weekend somehow burdens the local citizens' daily life and the tourism development.

Yet, in order to preserve the historical urban condition as a world heritage, it's not feasible and reasonable to set back the adjacent buildings to widen the motorway. Someone may propose that it's could improve the condition by restricting the entry of vehicles to the core zone of the old town, we need to be aware of the certain areas reserved for the parking lot in appropriate locations.

According, the river cruise provides an ideal way for local citizens or tourist to rapidly transit in the old town area. If the efficient boat trip transport system could be developed and collaborated with the trishaws to be transport network, the traffic jam could be highly improved.

Culture of the usage of waterfront public space

In the past, 'Dirty', 'Crowded' and 'Smelly' were common words the local people use to describe Malacca River. The river in their mindset was just a place for commercial and industrial activities and most of riverfront areas were fully occupied by private. Concerning the poor hygiene condition and the weak accessibility, the local would not intend to access to any riverfront area.

Besides, regarding the public space in Malacca, before the restoration of the river, there are not much clear defined public space. Even the large piazza at the Dutch square is mainly occupied by the tourists, nearly none of the local citizens would gathering around in that open area. And, different ethic groups would have their own culture of the use of public space. In general, people would gather around at their respective religious places like the mosque, church or temple. Actually, excluding mealtime, it's infrequent for diverse ethic groups to gather around at the same location.

For the Chinese, most of them don't have any habit of having any outdoor leisure activities or gathering. Ancestral halls would be one of their main communal spaces. After the river rehabilitation project, the use of the riverfront public space in the Chinese society is still pretty low.

For the Malaysian and the Indian, it's relatively common for them to stroll and promenade along the riverfront. Especially in the evening time, quite a lot local Indian would gather around Jalan Tun Ali. Some of them living far away from the old town area would park their car somewhere at the periphery of the historical old town and then walk to the town center via the promenade.

## Personal sharing

Being awarded the Tun Tan Cheng Lock Scholarship in Architecture, I am honoured to be given the chance to share with you my research findings during my research work during my travel and to share my experience with you here.

The research mainly focused on the urban aquatic void space regeneration of Asian cities. . On-the-spot investigation of several urban river rehabilitation projects in Asian cities were carried out in order to document and review some riverfront interface cases. Via interviewing local professionals and residents, the urban and cultural factors have been put together as a summary for each case study.

Having spent several weeks in various Asian cities, I would say that, as an Architecture stu¬dent, what I experienced was much more than expected. Over the past months in Shanghai, Seoul, Singapore,and Malacca, the travel have helped me to **re-ex¬plore my aspira¬tion, re-think the purpose of architecture, re-view architectural challenges in real life, and re-gain my passion as an evolving process.**

The Programme Structure

After three one week long study trips in distinct cities of Southeast Asia, a research exhibition would be set up in TTCL-Center in Malacca and a poster presentation would be held in IFOU conference in the National University of Singapore.

**Re-Explore**

Aquatic urban void space as Public asset

In order to maintain the sustainability for city development, 'Urban river is a public asset!' should be highly promoted to the world especially in developing countries. Nowadays, a number of cities are trying to upgrade their urban landscape by increasing the urban greenery coverage, which not only provides open space for the locals, but also lowers down the temperature by counteracting with the urban heat-island effect. However, vacant lots of land in the city area are scarce and costly. On the other hand, since

the waterways (natural streams or canals) in the urban context are generally used as sewage or stormwater discharge, and are generally governments' properties, it becoming a cost-free land lot could potentially initiate an upgrade to the public greenery area. After the river rehabilitation, the environment could be highly improved, hence, the further urban developments or renewals could be triggered off. Regarding the fact that waterways should be in linear form, a long and continuous public domain which is not easily found or created in existing urban city area, including a serious public space, could be acquired after the river restoration. Without doubt, this would be a highly cost efficient method to enhance the greenery and speed up the city's development at the same time.

**Re-View**

Challenge of designing with multiple-background professionals

While restoring and rehabilitating the urban rivers, architects were not the only person involved in the whole design process. Cooperate with different professionals such as the engineers, urban planners, landscape designer, political officers and the end users (the local citizens) were required. Without sufficient discussion or cooperation, although the outcome may seems successful and attractive, the utmost goal should be whether the urban river regain project could facilitate the surrounding urban development and also preserve the local history or cultural on the grounds that a successful project in urban renewal should be equipped with. A long-term vision which could lead to change in the urban fabric to fit into the future urban development is more vital than just an instant mirage.

I realized that Architects, who works on the urban river rehabilitation, have to be equipped with knowledge of different disciplines like culture studies, urbanization studies, landscape design and heritage conservation etc. I believe what I gain from various trips would make me become a more all-rounded architecture students.

Challenge of gentrification prevention

In all urban renewal projects, gentrification as a side effect would probably be brought out especially in urban river renewal projects. Tons of constructions like mega shopping mall or luxury high-rise residential buildings would rapidly invade the river precinct, and thus many social issues would be caused and the original residents may be forced to move out. Concerning that, I believe that a certain amount of old development conservation and new development works should proceed simultaneously. How to obtain a good balance in between would require further study and research. To avoid e¬¬¬xcessive gentrification the government would have to draw up the policy to maintain a sustainable city development.

**Re-Think**

Experiencing the urbanscape

Having walked and observed along the urban river in various cities, it is not hard to notice the variety of culture and living habits derived from the local climate and river scale. The history of the immediate neighbourhood are revealed along the river, and it is

## Personal sharing

the exploration which made the trip memorable.

Through talking with various end-users & professors, I could directly understand the needs of the local citizens and their opinion on the continuous urban renewal. Via the analysis of the riverfront interfaces in different cities, I learnt the possibilities on making various scenarios by using different amenities, landscape, lighting design in the rehabilitation of the urban river.

Having studied in cities of rich-culture, the sensitivity on the urban renewal and culture conservation of citizens and professionals has led me to re-think what we should look into ar¬chitecture as a tool to urban renewal and conservation of the historical heritage in Hong Kong.

**Re-Gain**

Something more than knowledge
Passion for architecture

The travels provided me a golden opportunity to meet a number of professional and the local citizens from different part of the Southeast Asia. Cross-nations friendships were built up through the frank and passionate sharing on urban, architecture, heritage conservation and local culture related issue amongst the team despite the tight schedule and limited time. I am very fortunate to meet ambitious professionals and indeed treasure all chances to learn from them as most of them are very enthusiastic about providing guidance for the younger generation. Undoubtedly, I regain even more passion on the architectural studies after sharing with all outstanding professionals.

**Acknowledgements**

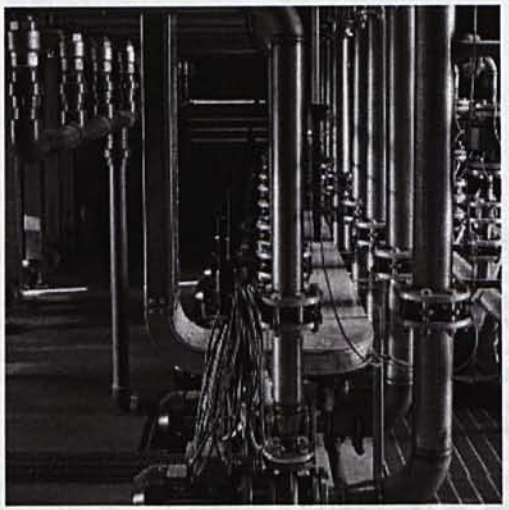
I am very thankful to all the supporting professionals, partities, institutes and origanizations which facilitated such a fruitful travelling scholarship.

Here is my special thanks to Ms Agnes Tan (patron), Mr Peter Lee, Mr Wong Yunn Chii, MrJohannes Wididodo who were full of passion and devoted a scholarship to the students to work on research on urban and architecture heritage. I am very proud to be the first recipient of the Tun Tan Cheng Lock Scholarship.

Very special thanks to the following professionals from their different cities:

Sha Yongjie (Shanghai), Yuyang Liu (Shanghai), Frank Chow (Hong Kong), Haewon Shin(Seoul), Choe Sanki (Seoul), Changhi Yun (Seoul), Wan Azhar Sulaiman (Selangor), Abong Hafiz (Malacca) and Mohd. Sam B. HJ. Ahmad (Malacca).

Special gratitude to
The Department of Architectre, NUS and Tun Tan Cheng Lock (TTCL) Centre for Asian Architectural and Urban Heritage which organizes the scholarship and the IFOU conference. And, Special thanks were given to my thesis advisor Wallace Chang, and my friends, Alvin Kung, Byeong-kuk Na , Esther Juhye Chung, Annie Wong, Sarah Ng, Samantha Wan and Yel Wong.



Special Study

00 Constructed Wetland

Role of constructed wetland
Composition of constructed wetland
Constructed wetland construction

01 Urban Sewage Treatment

Conventional sewage treatment flowchart
Biological sewage treatment flowchart

## Wetland Technology As An Environmental Breakthrough

in the late 1970's to 1980's, the EPA and the micobiologists teamed up to find an economical alternative in wastewater treatment. The ecology of pond, marsh and meadows, otherwise knowwn as wetlands, became more attractive because of their selfmaintaining and self-regulating nature. They are powered by solar energy and energy stired in the organic content of wastewater and they are simple to construct and operate. These wetlands are able to break down toxic organic compounds, and remover metals by incorporating them in biologically stable compounds or in aquatic plants.

In auqatic systems, wastewater is treated mainly by means of baterial metabolism and physical sedmientation (with the plats as the supporting component), as is the case in conventional activated sludge and trickling filter systems (USEPA, 1988)

## Constructed Wetland Concept

The concept of constructed wetland is that via artificial construction, supervision and control, a full use of sewage purification in the wetland system could be achieved.

The whole system inlcudes the use of the ecosystem of the physical, chemical and biological triple synergy, through filtration, adsorption, precipitation, ion exchange, plant uptake and microbial decomposition to achieve the efficient purification of sewage "

## Main Elements Constitute Constructed Wetland

01 a variety of permeability of the substrate (e.g. soil, sand, gravel)
02 vegetation which grow in saturated water and anaerobic substrate (e.g. reed)
03 water (in the substrate surface or under flowing water)
04 invertebrates or vertebrates animals;
05 aerobic or anaerobic microbial population

## Function of Wetland

01 nutrient (nitrogen and phosphorous) removal and recycling
02 sedimentation of suspened and colloidal solids
03 biological oxgygen demand (organic compounds capable of being oxidized by bateria) digestion and removal
04 metals precipitation and incorporation in Bio-Systems
05 pathogens removal through die-off and sedimentation
06 toxic organic compounds degradation

## Basic Processes In Constructed Wetland

01 substrate filtration (like water dispenser)
02 vegetation absorption
03 microorgan

wetlands area a biochemical factory where nutrification, dentrification, phosphorous recycling, organic decomposition, biodegration of toxic chemicals, solids and hydrocarbons, metal chelation, precipiptation, etc, occur. Wetlands remove all undesirable compounds by converting them to useful products and chemicals.

ecologically speaking, wetlands are more efficient in biomass production than any other environment besides the rain forest. The iomass produced is equivalent to the large mass of nutrients and sediments that are wasjed into the wetlands.

## Application of wetlands

Buffer zone (storage point) in the watershed

to serve as a buffer zone by accpeting treated effluent
like natural sponges that trap and intercept water to be released slowly over time
to protect the community from flooding and erosion casused by storm surges*
the wetland plants and vegetation further slow down the water flow
as a polishing stage and enhance ment of wildlife

Further purification

to treat and process partially treated wastewater thus serving as secondary or tertiary wastewater treatment stage. wetland systems have been used to accepted pretreated effluents to serve as a water enance ment step while simultaneously sustaining wildlife habitat.

Source of water

to support the plant nursery
to replenish groundwater during dry period
to support the flusning water
to support the irregation

Conduit of recreation & education

to provide a place for outdoor river ecology learning unit
to provide a place for bird watching.

## Win Win Solution Between Mankind And Nature

wastewater may be reused, recycled and renewed at the benefit of the wetland plants and organisms. Additionally, wetlands could also provide food and habitat for wildlife, flood protection, shoreline erosion control and recreation appreciation.

## UNQIUENESS of each cases

there exist many types of wetlands that are in operation, each specifically designed to suit its ambient environment and each custom-geared towards the treatment of its community's wastewater.

## Design Parameter

01 BOD (biochemical oxgyen demand)

02 Suspened solids

caculation of wetland surface area is critical in providing a site for wastewater-treating-microorganism to thrive, as well as an ample bed for aquatic plants to glow, thus producing more surface area for microbial organism.

## Two Flow Categories For Wetlands

Free Water Surface Systems (FWS)

to allow a shallow depth of water to flow over the surface from begining to end.

Subsurface Flow System (SSF)

consist of a porous media bed that allows water to trickle through within the bed from begining to end, hindering flow across the top surface

# 00 Constructed Wetland

## CONSTRUCTED WETLAND CONFIGURATION

**as a manmade living cell**

The concept of constructed wetland is that via artificial construction, supervision and control, a full use of sewage purification in the wetland system could be achieved.

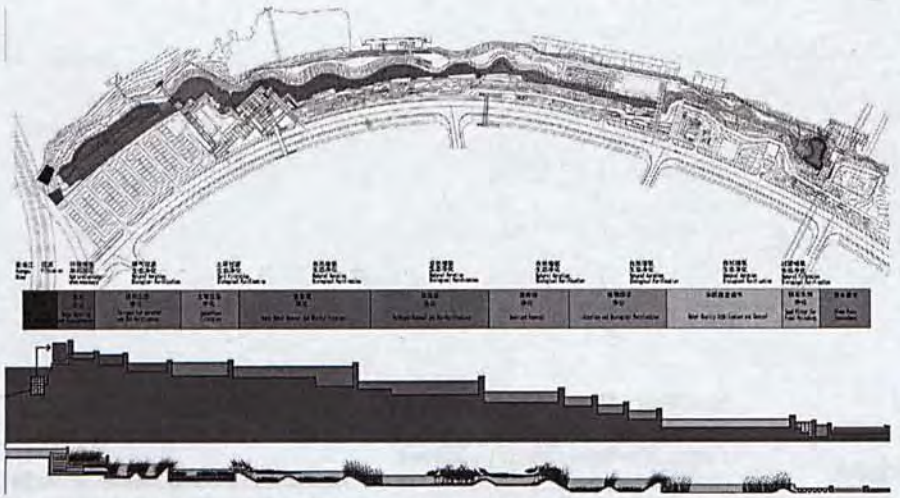
The whole system includes the use of the ecosystem of the physical, chemical and biological triple synergy, through filtration, adsorption, precipitation, ion exchange, plant uptake and microbial decomposition to achieve the efficient purification of sewage

FIXED DEPTH OF THE WETLAND CELL

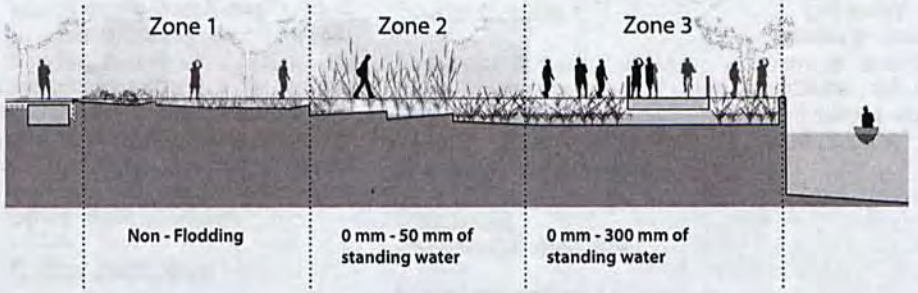
should not exceed 1.5 ft. or 0.45 m in the flowing water surface (F.W.S.) wetland.

LENGTH AND WIDTH PROPORTION

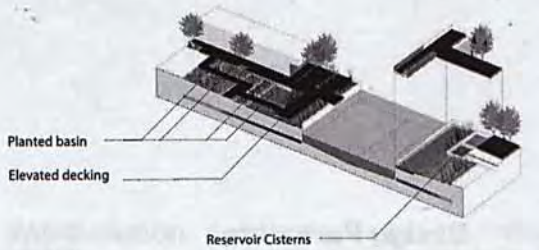
the length and width of the area may be chosen based on conventional ratios of width to length (1:4 to 1:10) which yield narrow wetlands that ensure plug flow, and prevent cologging.



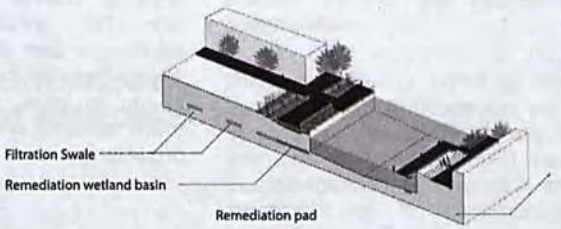
Example of pubic access to the waterfront in the wetland




Multi-leveling , Grid pattern & elevated decking should be adopted in order to faciltate the public access and the wetland plant s' growth




Planted basin, Reservoir cisterns, Plant Filtration Swales and Remediation Pad should be installed to support the ecology of the wetland.

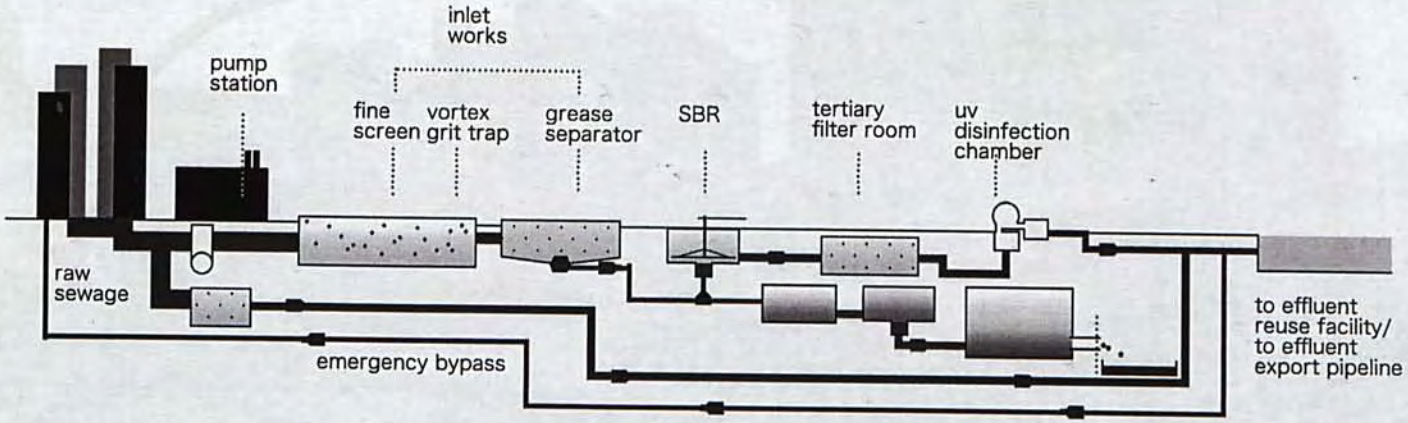


# 01 Urban Sewage Treatment

***Conventional mechnical approach***

SPATIAL TYPE

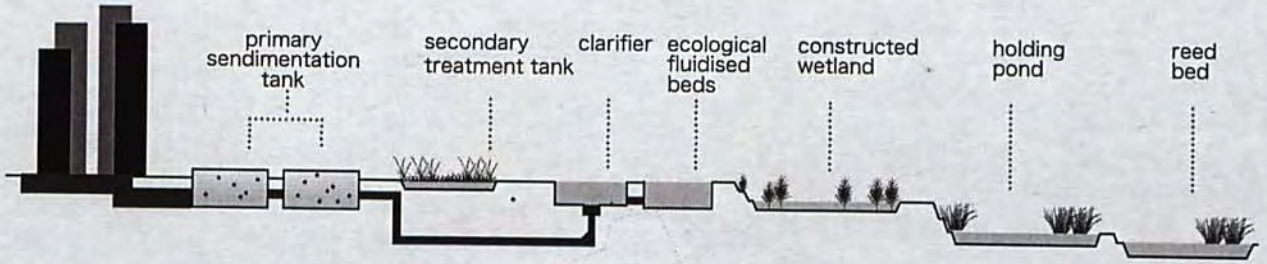
ENCLOSED TANKS ANPONDs




***biological approach***

SPATIAL TYPE

OPEN GREENERY AND WETLAND




NG WAH CATHOLI

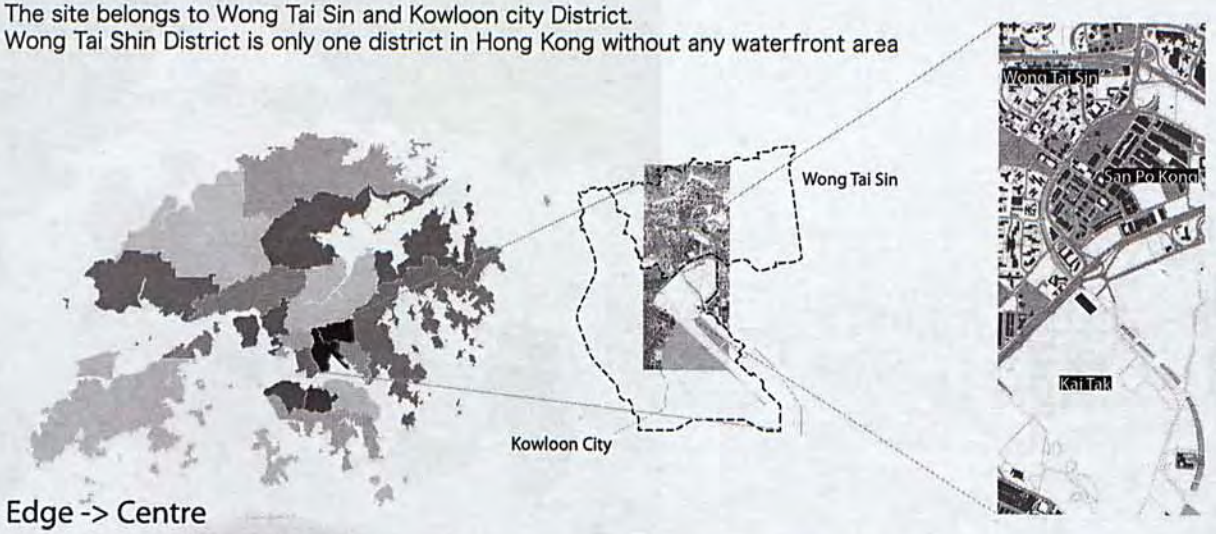
Design 00 Site Analysis

# A Seal of Hong Kong History - Kai Tak River

## 啟德河。一個重塑香港本土歷史文化的機遇

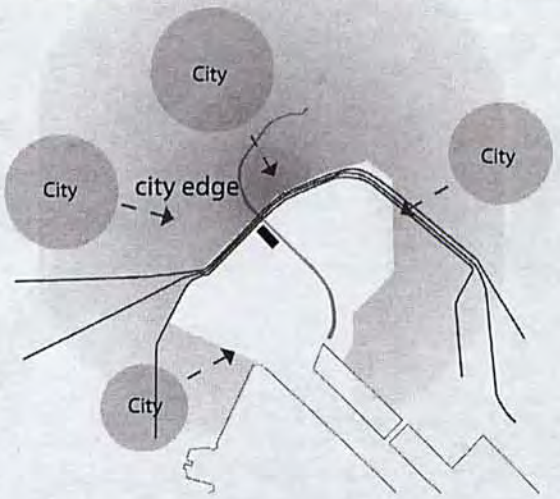
# 00 Site Analysis . Location

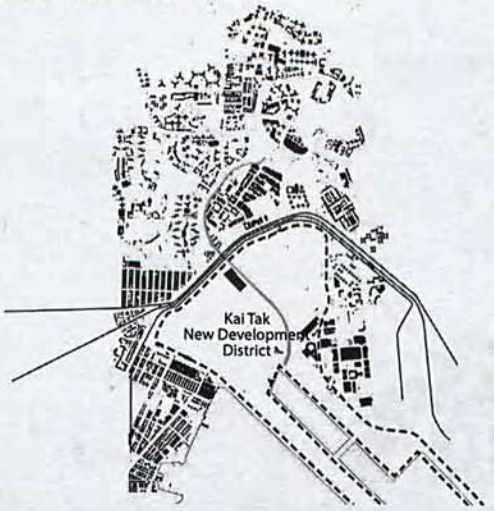
The site belongs to Wong Tai Sin and Kowloon city District.
Wong Tai Shin District is only one district in Hong Kong without any waterfront area




## Edge -> Centre

During city expension, the site condition was change from city edge to the city cen-




# 00 Site Analysis . Layers of Infrastructure

## LAYER 01
## GREENERY PRECINCT

1 Morse Park

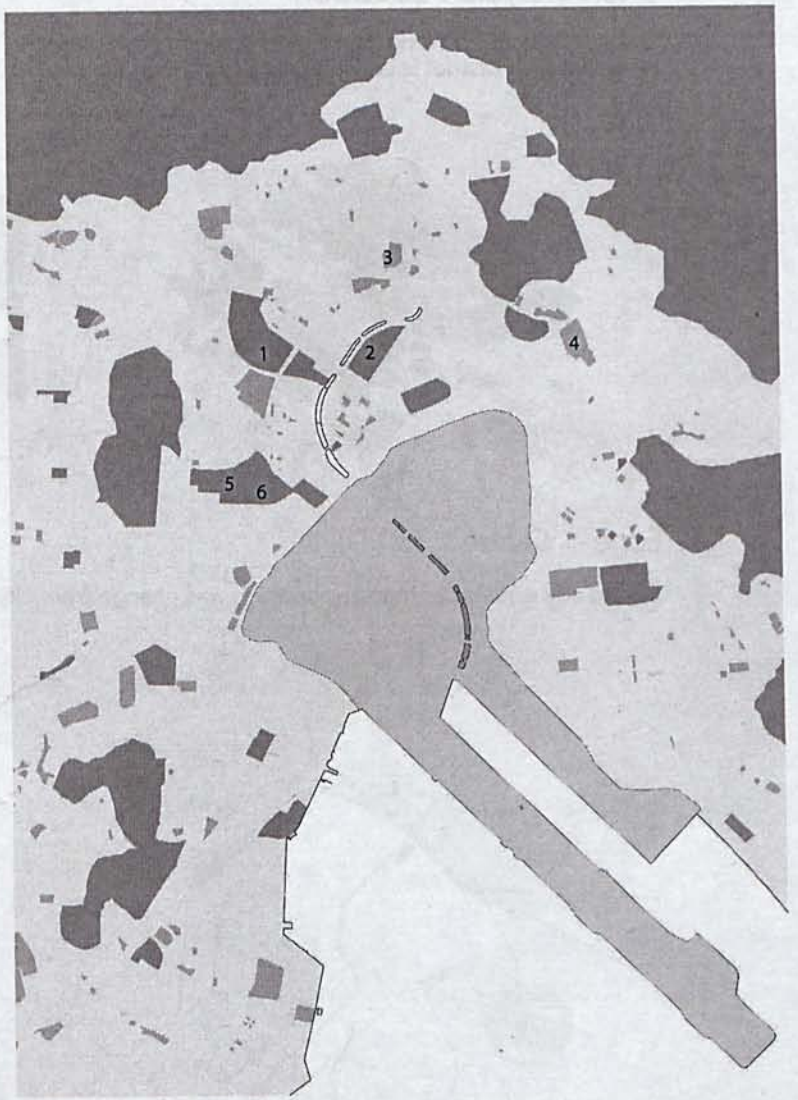
2 Choi Hung Road Playground

3 Fung Tak Park

4 Nam Lian Garden

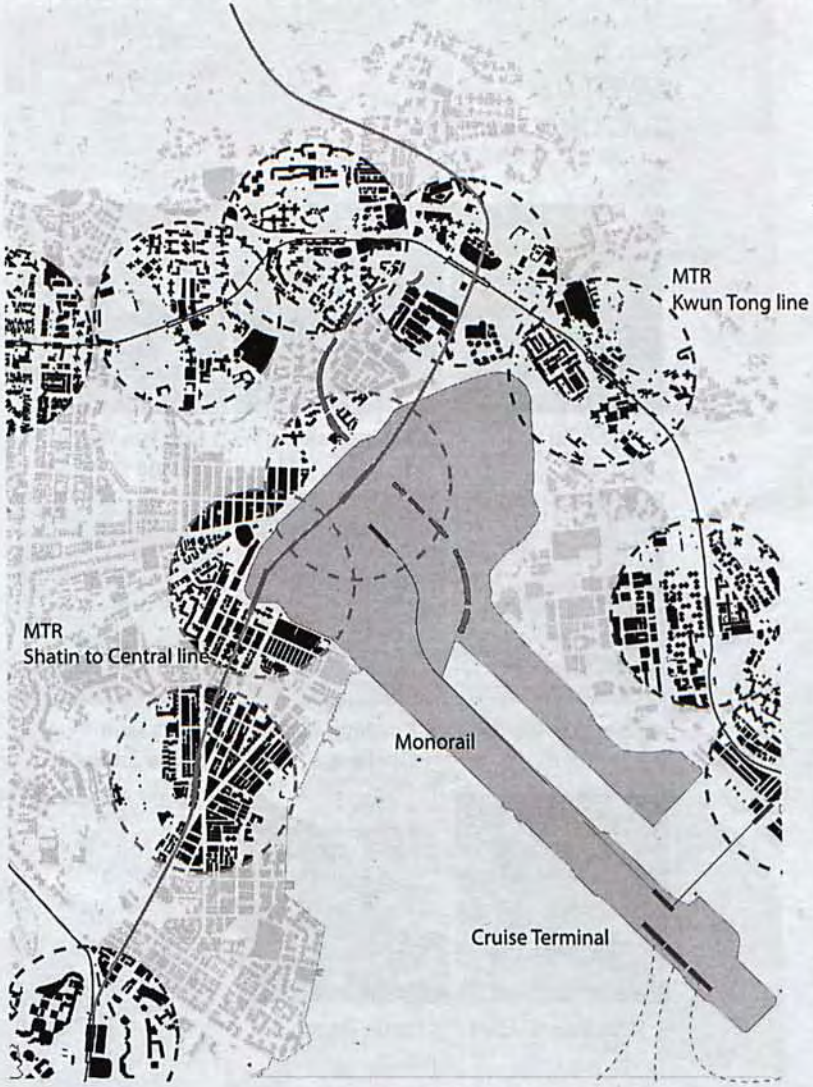
5 Kowloon Walled City Park

6 Carpenter Road Park



00 Site Analysis . Layers of Infrastructure

LAYER 02
TRANSPORT SYSTEM



LAYER 03
CULTURAL PRECINCT

1 Wong Tai Shin Temple

2 Chi Lin Nunnery

3 Nga Tsin Wai Village

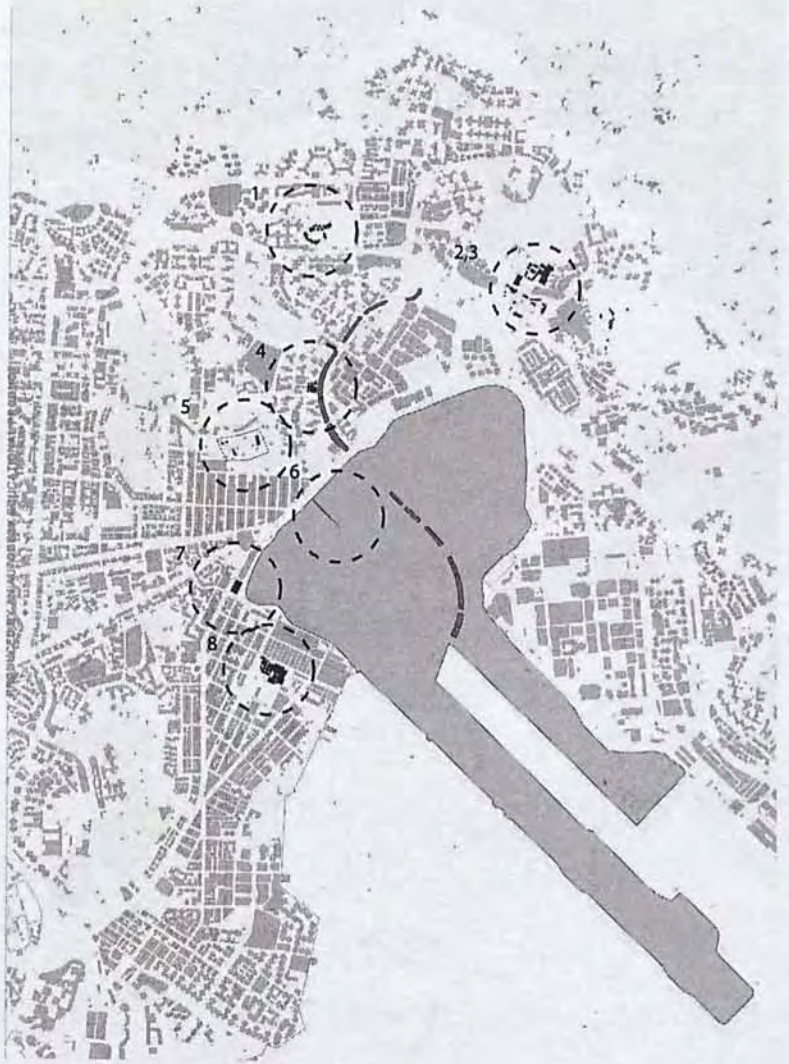
4 Nam Lian Garden

5 Kowloon Walled City Park

6 Lung Tsun Stone Bridge

4 Nam Lian Garden

5 Cattle Depot



## LAYER 04
## WATER NETWORK

Underground water storage

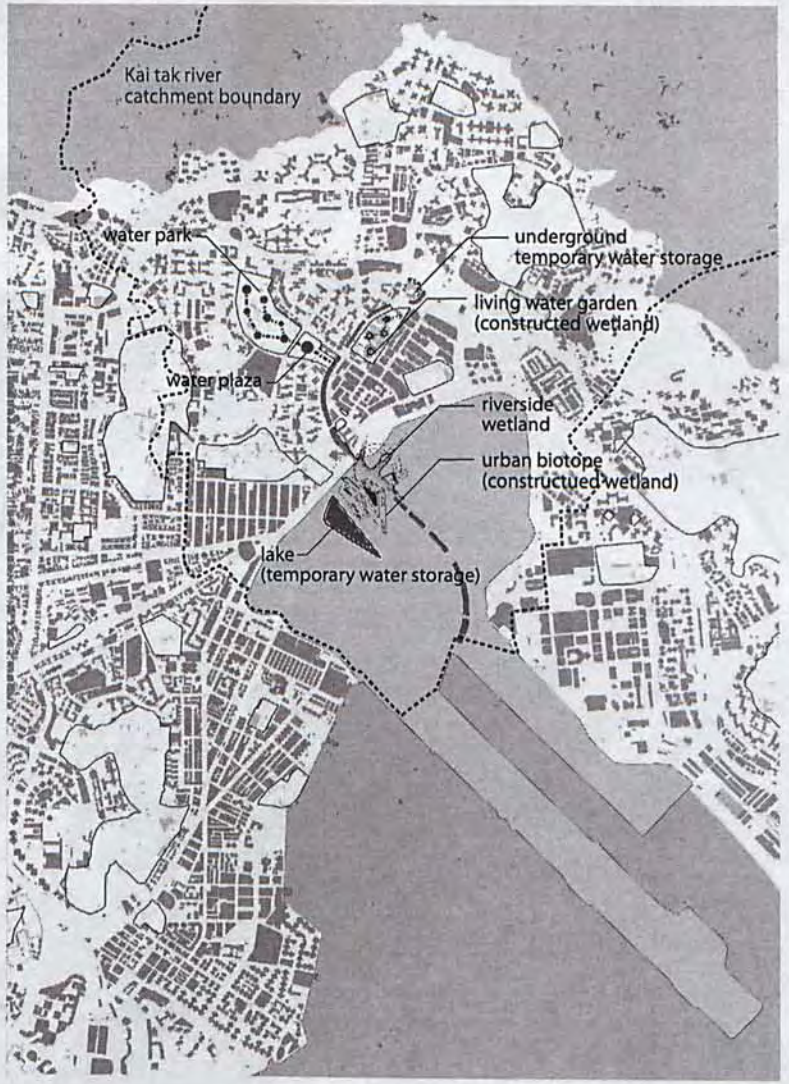
Living water system

Riverside wetland

Lake

Water plaza

Water Park



Design 01 Design Concept (Urban Scale)

# Macro urban biotope - Kai Tak River

## 啟德河。生態 景觀 建築 文化 多元生境


# MACRO URBAN BIOTOPE

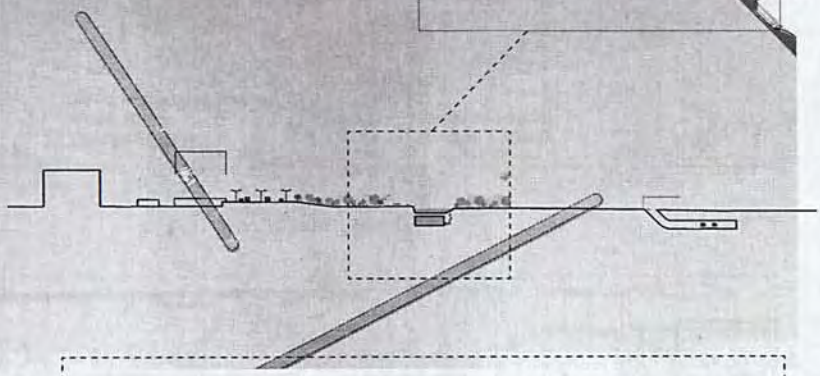
## Kai Tak River as urban regenerator

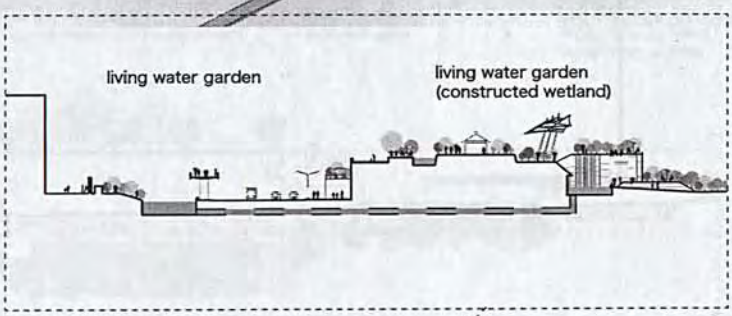
in order to satisfy the cultural demand and ecological concern, Kai Tak River would be regenerated by re-connecting different infrastructures and re-networking the urban public space, and thus the urban fabric in the river precinct could be weaved and the riverfront area would be more habitable.

Existing
Site
Condition

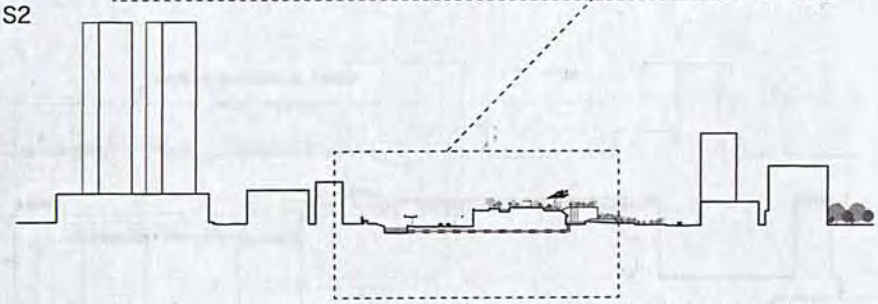
Design proposal
(riverfront zoom-in)

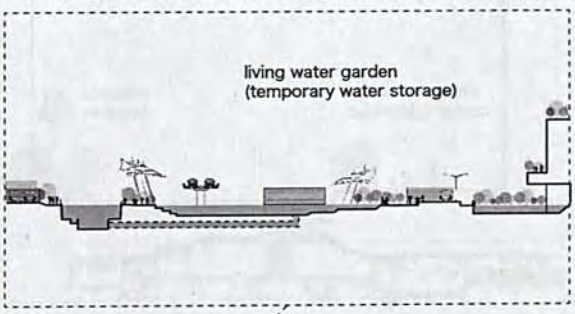
S1



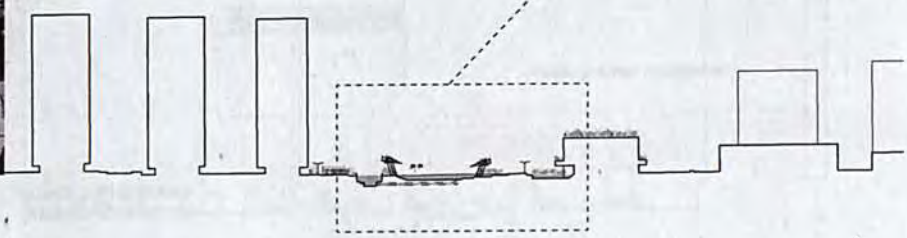




S2



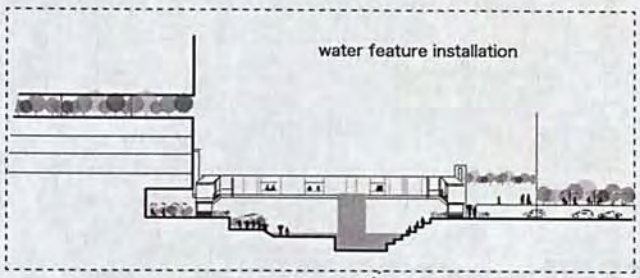



S3

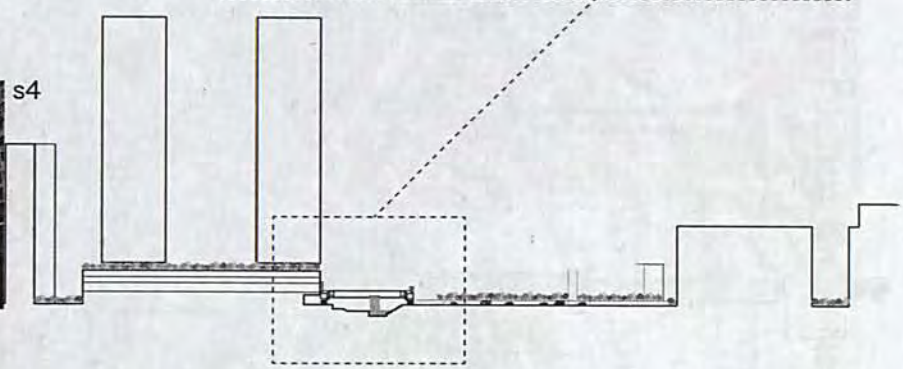


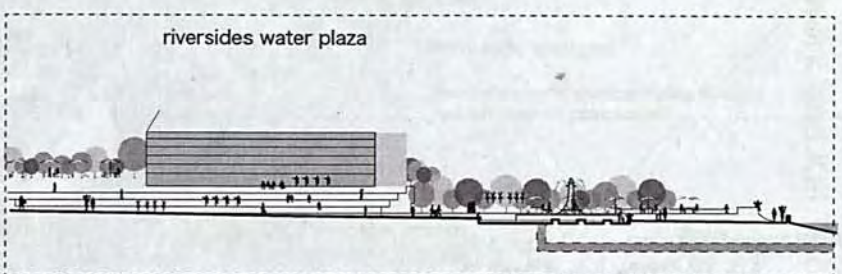
Existing
Site
Condition

Design proposa
(riverfront zoon

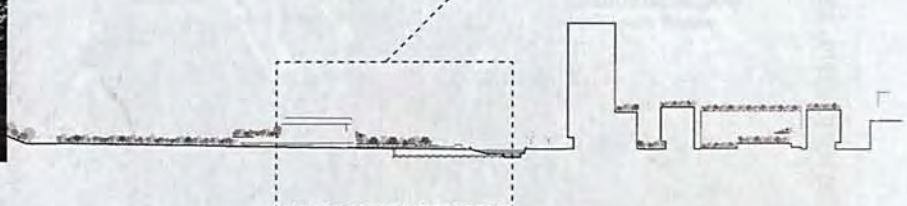


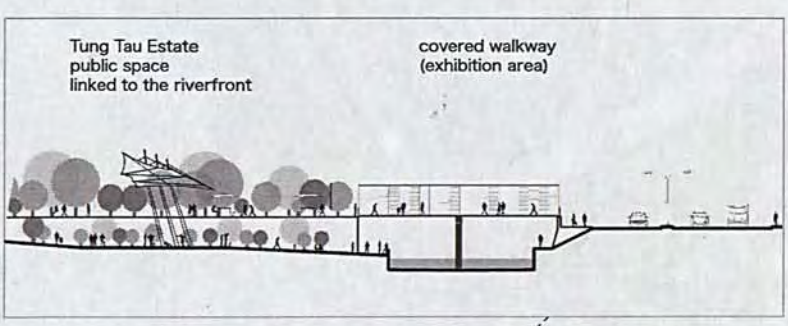

s4



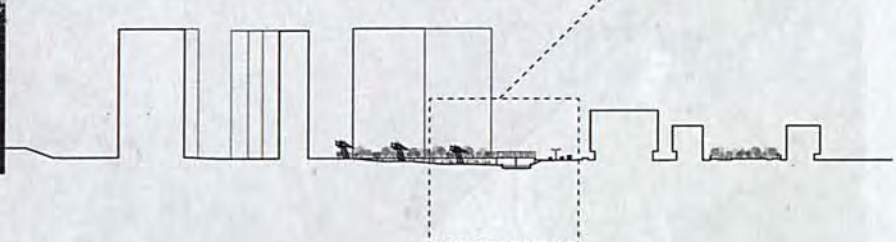


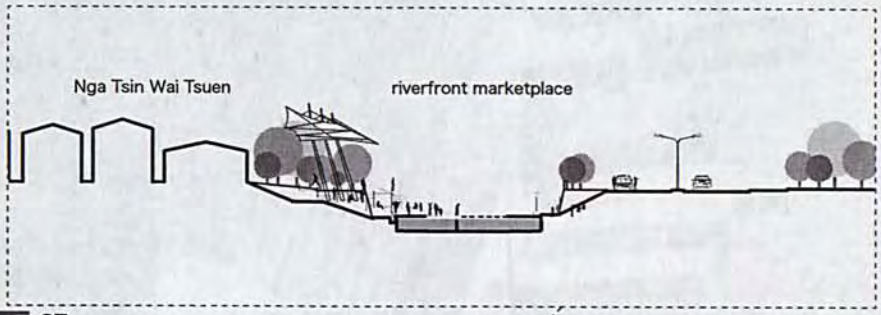

s5



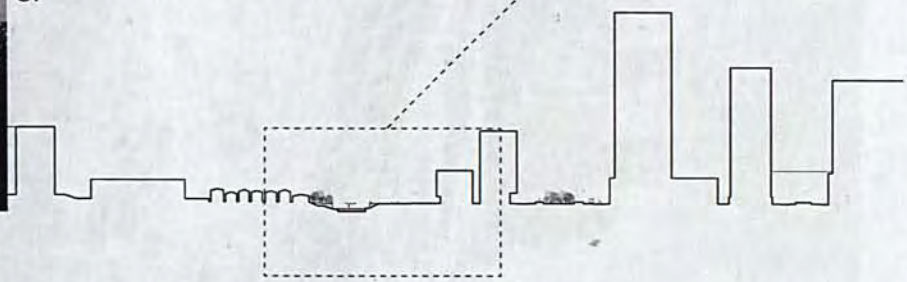


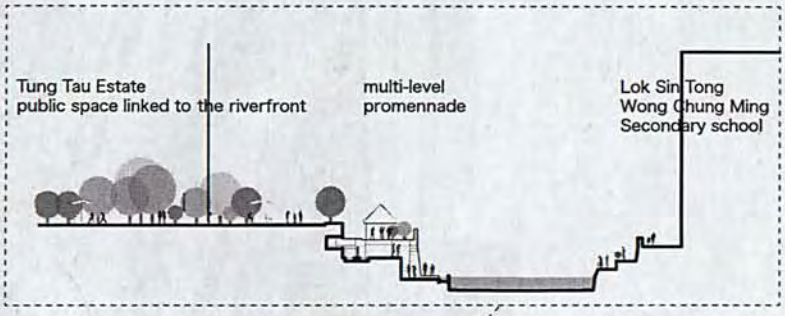

s6



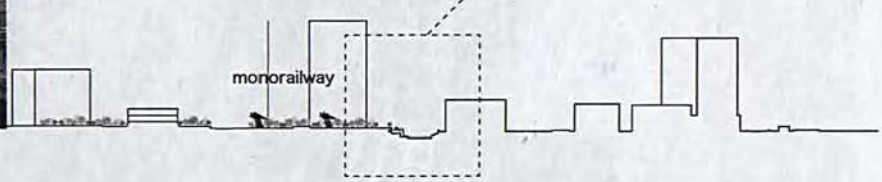

Nga Tsin Wai Tsuen
riverfront marketplace

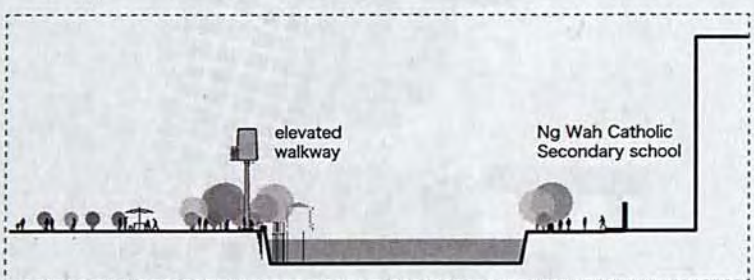
S7



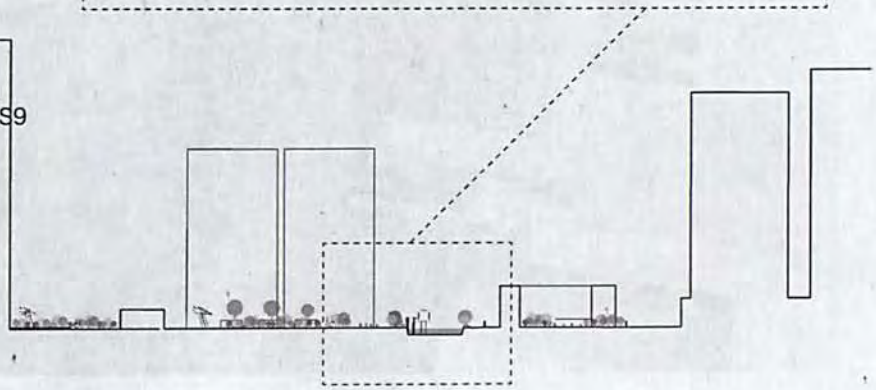

Tung Tau Estate
public space linked to the riverfront
multi-level
promennade
Lok Sin Tong
Wong Chung Ming
Secondary school

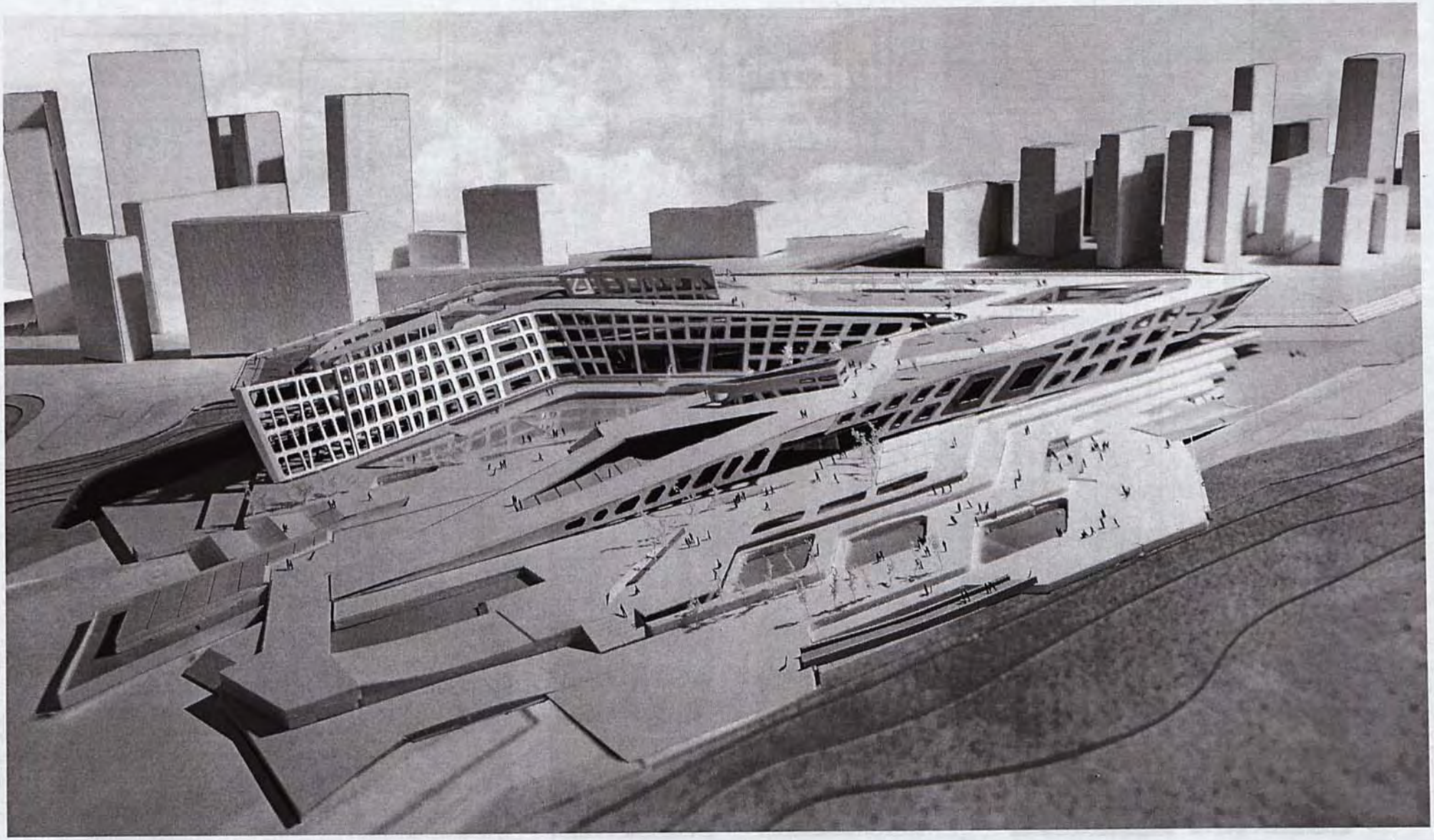
S8


monorailway


elevated
walkway
Ng Wah Catholic
Secondary school

S9





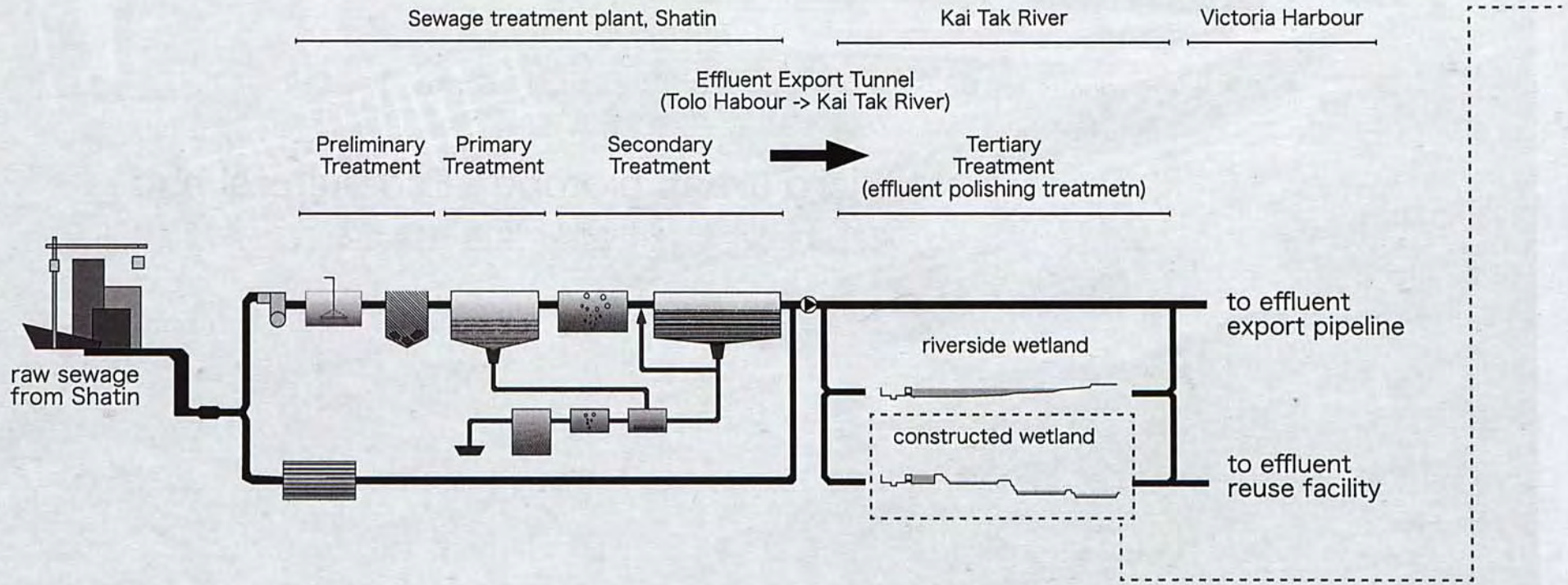
Design 02 Design Concept (Architecture Scale)

# Micro urban biotope - Eco-cultural hub

可持續發展河畔城市空間。生態 景觀 建築 文化 多元生境系統

**KAI TAK RIVER**

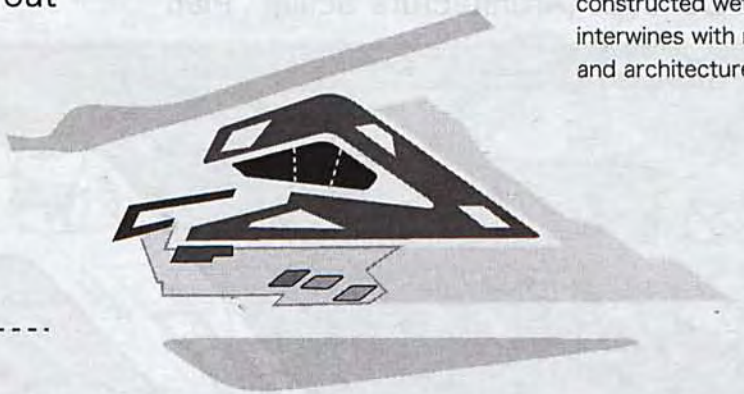
HYBRID OF MECHNICAL AND BIOLOGICAL
SEWAGE TREATMENT PROPOSAL



# 02 Design Concept (Architecture Scale) . Landscape Layout

**Eco-Cultural Hub**

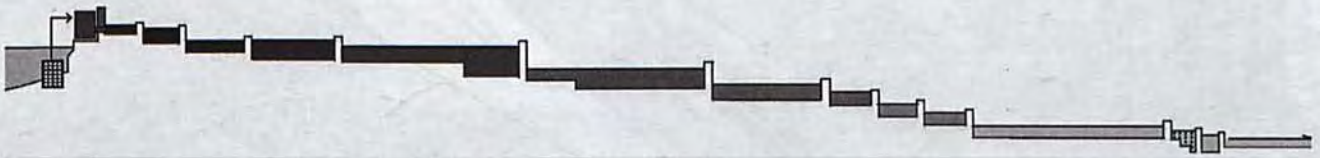
HYBRID OF
ARCHITECTURE ,MANMADE LANDSCAPE
AND CONSTRUCTED WETLAND



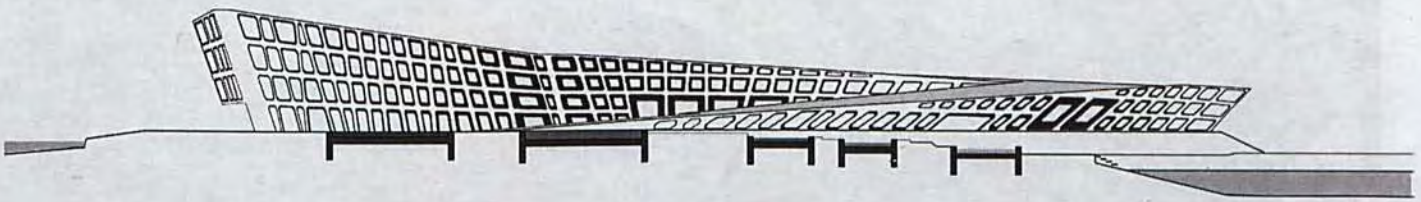
constructed wetland system
interwines with manmade lanscape
and architecture

Using the constructed wetland layout as a key element to generate the form of architecture (manmade landscape)

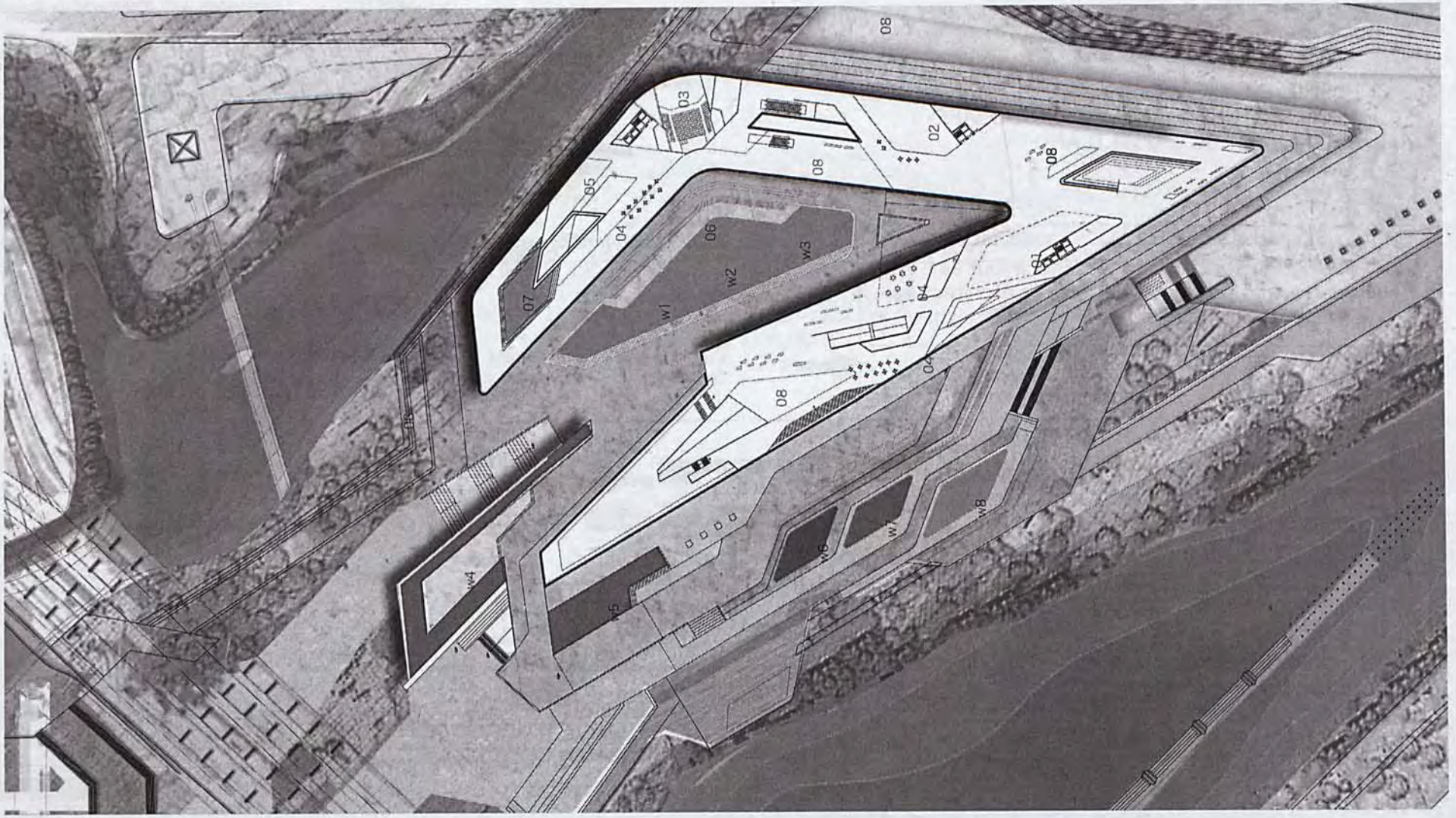
cross-sectional of typical constructed wetland



gentle level change to blur
the boundary between the
architecture(manmade landscape)
and the constructure wetland



02 Design Concept (Architecture Scale) . Plan



# MICRO
# URBAN BIOTOPE

## (ECO-CULTURAL HUB)

Ecological Linkage

to cooperate with constructed wetland cells and riverside wetland which linked to the rivershed of Kai Tak River for the water recycling and the further water polish treatment.

to introduce the biological water filtration to the building and public space design and thus arouse the public awareness on the ecology and the city development.

to intoduce the educational ecology museum to be a headquarter of river ecology learning unit providing ecological tours for the local students.

Cultural Linkage

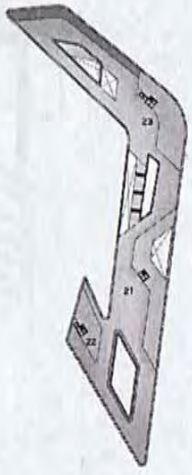
to rpovide a large green open area in a high dense city as a communal space for the local residents, citizens in other districts and tourists from the adjacent stadium and the Kai Tak Cruise Terminal

to act as a tourists centre to introduce for the adjacent cultural monument and historical buildings.

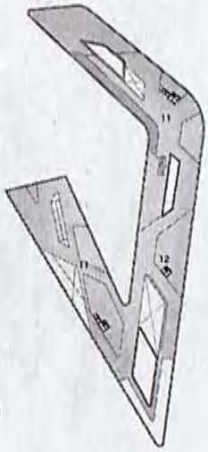
Transport Linkage

to cooperate with the Kai Tak MTR station development and the Kai Tak Cruise Terminal

LV 3



LV 2



LV 1

**LV 3**
31 offices

**LV 2**
21 ecology leanring centre
22 special library
23 ecology research lab.

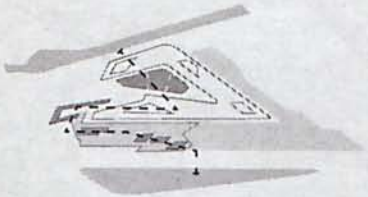
**LV 1**
11 ecology museum
12 children playground

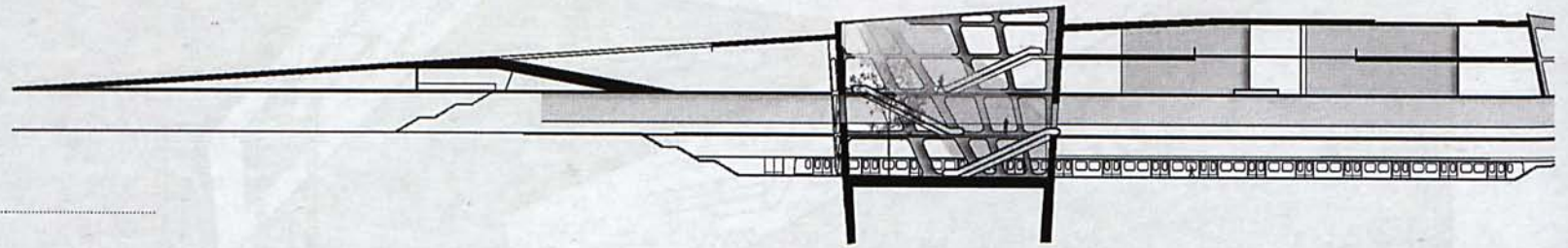
**LV 0**
01 tourist centre
02 multifunctional hall
03 theatre
04 restaurant /cafe
05 book store
06 water plaza
07 children playground
08 exhibition area
09 constructed wetland (w1-w8)

**LV B1**
kai tak mtr station (concourse level)
retail shops
ecology learning unit
(adjacent to the constructed wetland cell)

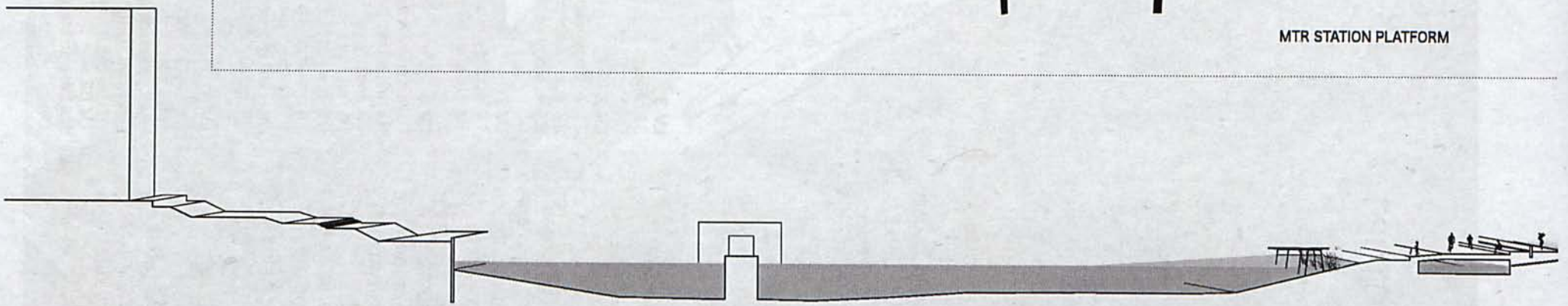
**LV B2**
kai tak mtr station (platform level)

02 Design Concept (Architecture Scale) . Unfolded Section

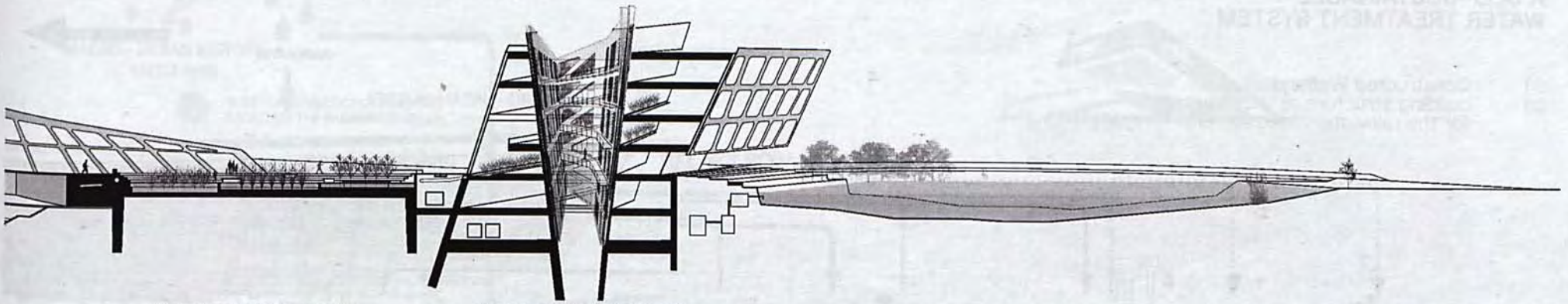


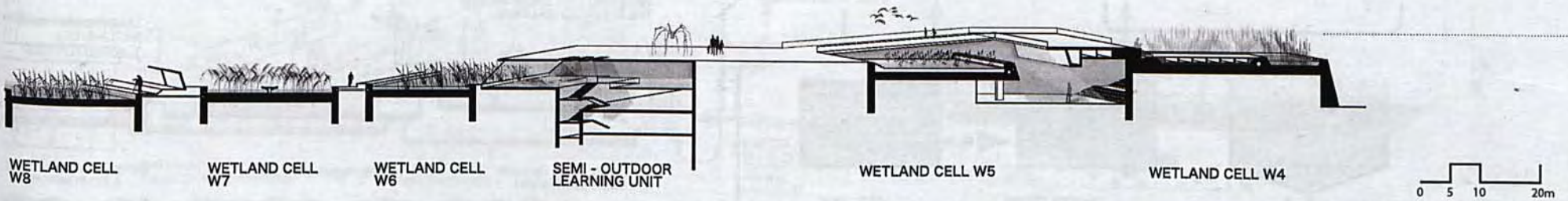


MTR STATION PLATFORM



LUNG TSUN STONE BRIDGE


WETLAND CELL (W1 W2 W3 )
BIOLOGICAL TUBE STRUCTURE
(VERTICAL GREENERY AND RAINWATER COLLECTION SYSTEM)
KAI TAI RIVER

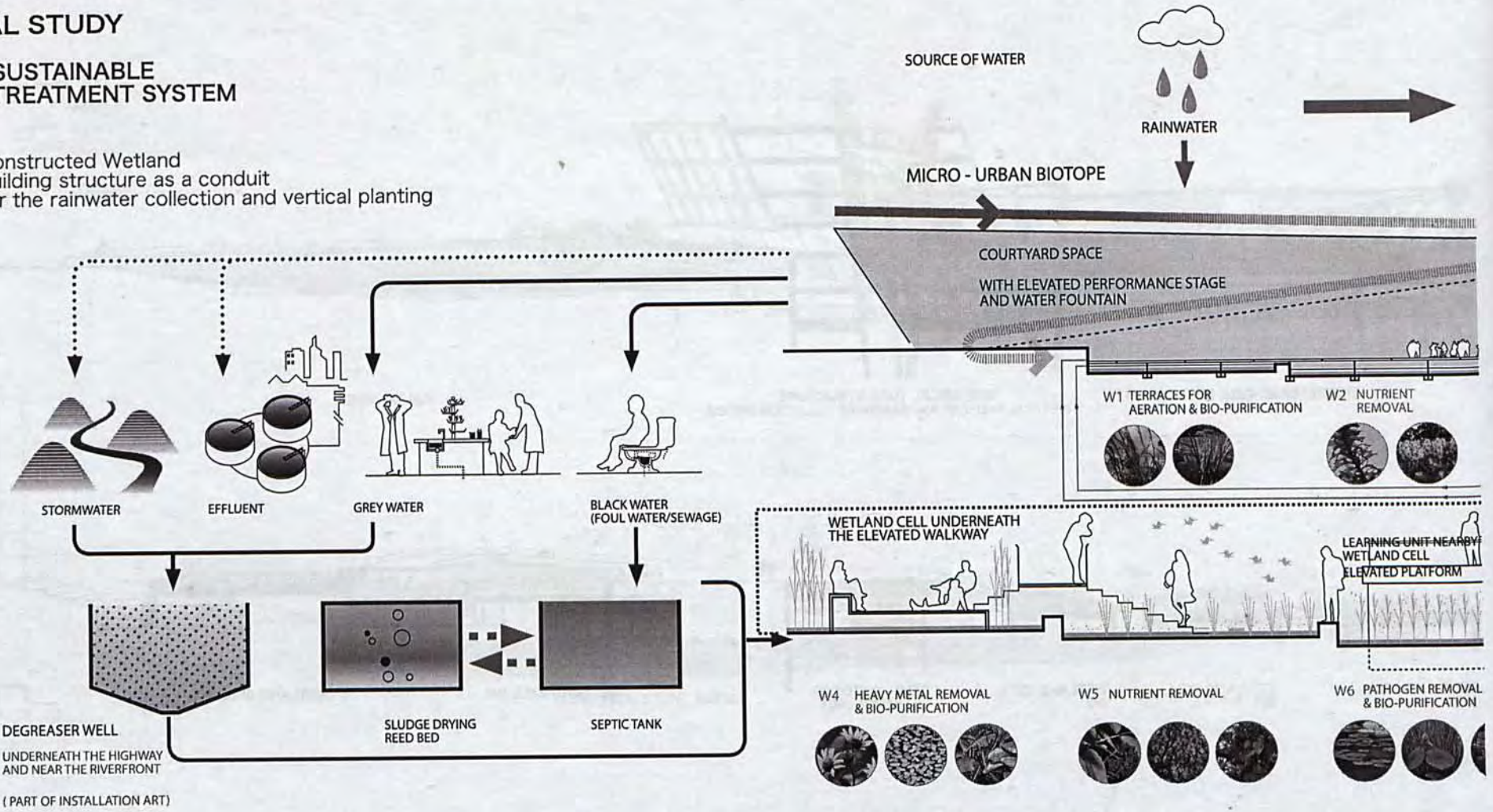

WETLAND CELL W8
WETLAND CELL W7
WETLAND CELL W6
SEMI - OUTDOOR LEARNING UNIT
WETLAND CELL W5
WETLAND CELL W4
0 5 10 20m

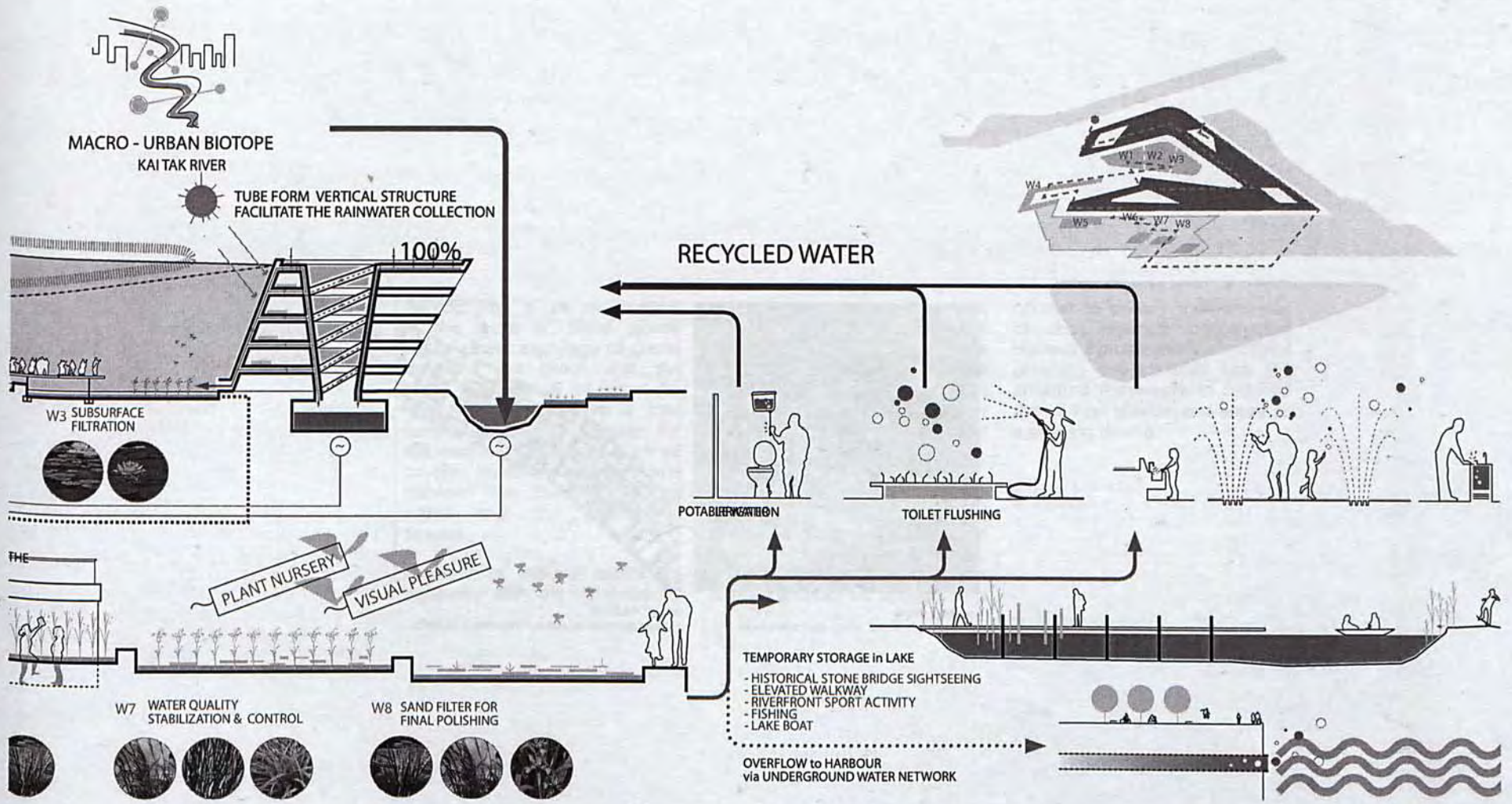
02 Design Concept (Architecture Scale) . Conceptual Diagram

## SPECIAL STUDY

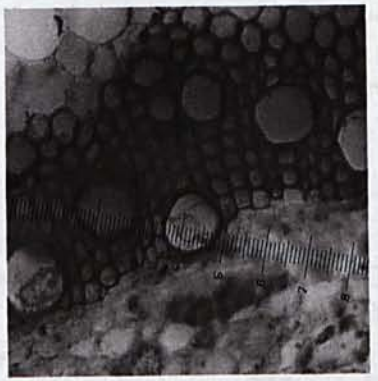
## A SELF-SUSTAINABLE WATER TREATMENT SYSTEM

01 Constructed Wetland
02 building structure as a conduit for the rainwater collection and vertical planting

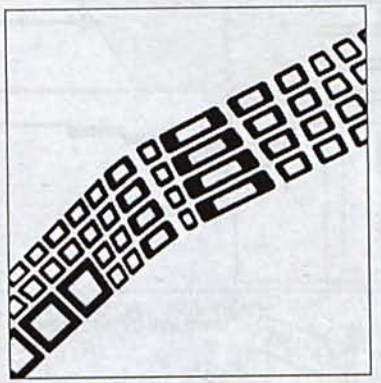



MACRO - URBAN BIOTOPE
KAI TAK RIVER
TUBE FORM VERTICAL STRUCTURE
FACILITATE THE RAINWATER COLLECTION
100%
RECYCLED WATER
W1 W2 W3
W4
W5
W6
W7
W8
W3 SUBSURFACE
FILTRATION
POTABLE WATER
TOILET FLUSHING
PLANT NURSERY
VISUAL PLEASURE
TEMPORARY STORAGE in LAKE
- HISTORICAL STONE BRIDGE SIGHTSEEING
- ELEVATED WALKWAY
- RIVERFRONT SPORT ACTIVITY
- FISHING
- LAKE BOAT
W7 WATER QUALITY
STABILIZATION & CONTROL
W8 SAND FILTER FOR
FINAL POLISHING
OVERFLOW to HARBOUR
via UNDERGROUND WATER NETWORK

# 02 Design Concept (Architecture Scale) . Sustainble architectural features



wetland plant
aerenchyma (stem) cross sectional photo



urban biotope
facade and tube structure framework pattern

## Nature as a source of inspiration

Aerenchyma is an air channel in the roots of some plants, which allows exchange of gases between the shoot and the root. The channel of large air-filled cavities provides a low-resistance internal pathway for the exchange of gases such as oxygen, methane and ethylene between the plant above the water and the submerged tissues.

As most of wetland plants are equipped with the aerenchyma, wetlands are one of the most significant natural sources of atmospheric methane. Besides, a wetland will naturally change the amount of methane emitted from its soil according to different surrounding environment conditions

For my design, the facade and tube structure's patterns and framwork are inspired from the aerenchyma of the weland plant. Similarly, the facade ans the tube structure could be applied as a conduit to dilivery the rainwater to the adjacent constructed wetland system and the verttical greening cell installed into the structure framework to reduced the carbon dioxide and serve as a shading device.

# 02 Design Concept (Architecture Scale) . Parametric Facade Design

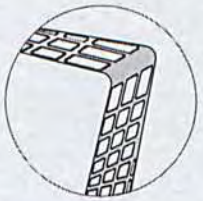
## FACADE

**AS A VERTICAL STRUCTURE**
**AS A SUN SHADING DEVICE**
**AS A PLACE FOR GREENING**
**AS A CONDUIT FOR RAINWATER COLLECTION**

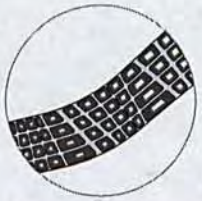
isometric view of facade framework

The facade consists of two layer
(structural member & vertical greening cell).

The structural members not only transfer the loadings but also delivery the rainwater collected from the rooftop level and the light wells to pass through vertical greening cells and finally to constructed wetland or directly to the underground water storage tanks. And then, the collected water could be filtrated / polished for the further reuse.

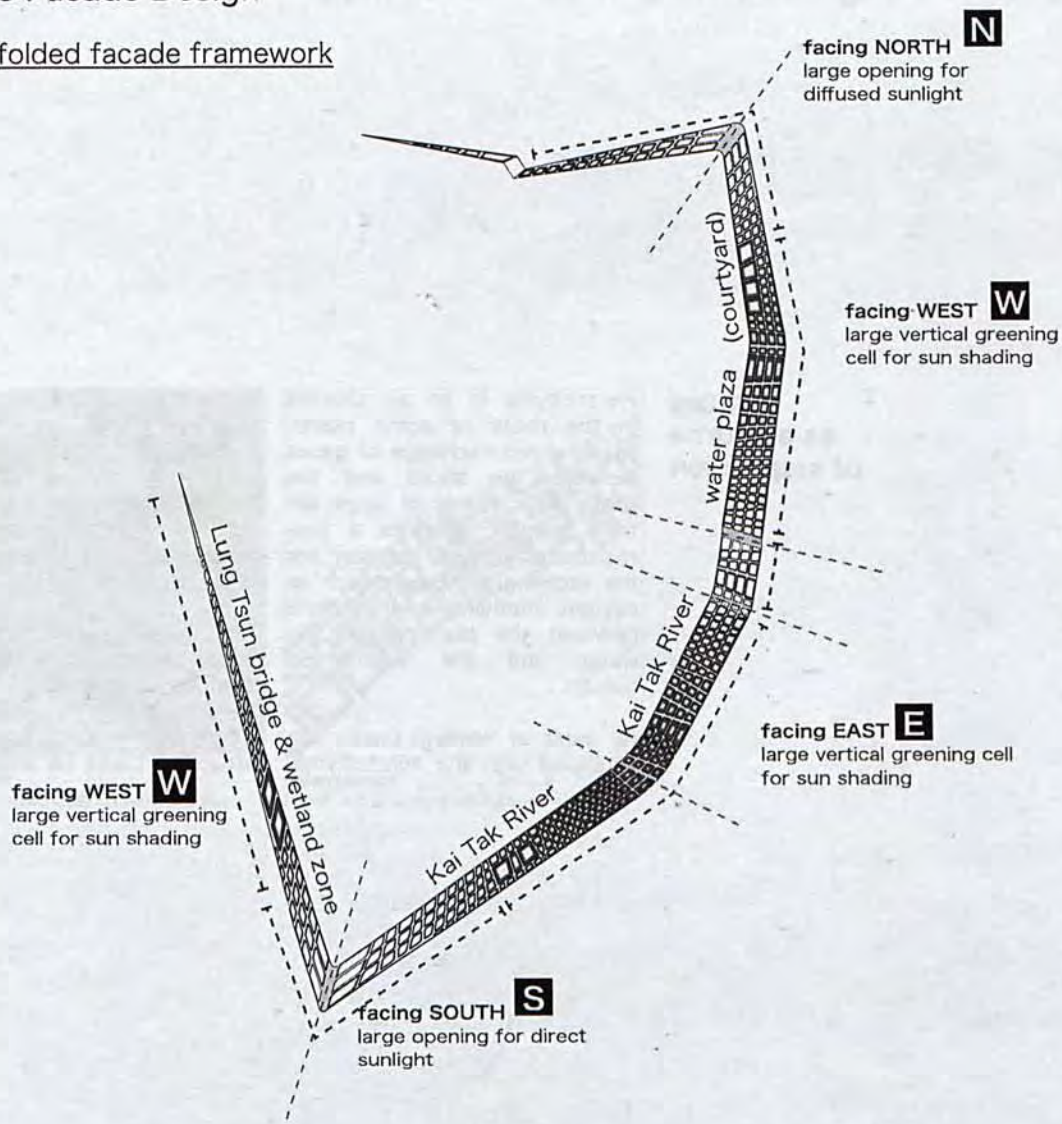


**large opening** for direct/indirect sunlight



**large vertical greening cell** for shading the undesired sunlight

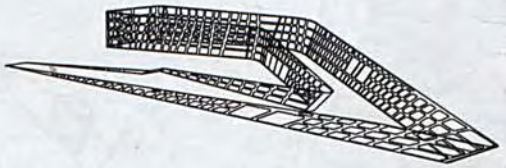
unfolded facade framework

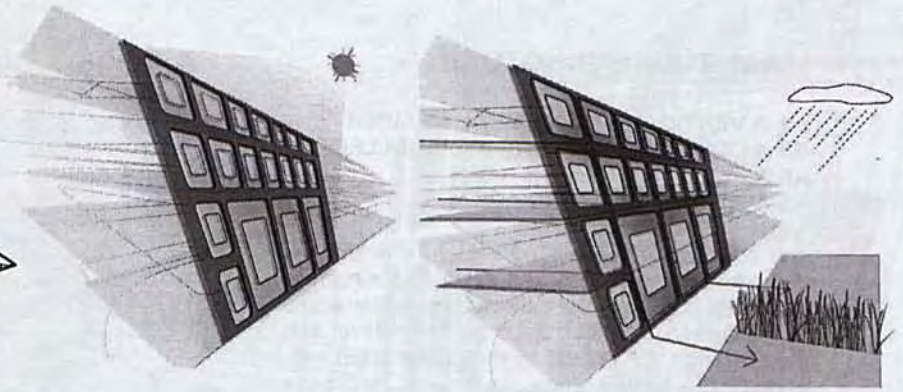


# 02 Design Concept (Architecture Scale) . Parametric Facade Design

## LAYER 1
## STRUCTURE
## FRAMEWORK

isometric view of steel framework





sunshading

size of the opening varies depending on the direct sunlight direction.

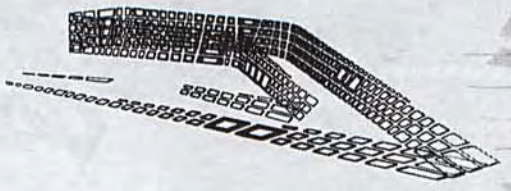
larger opening appplied for the south and north direction

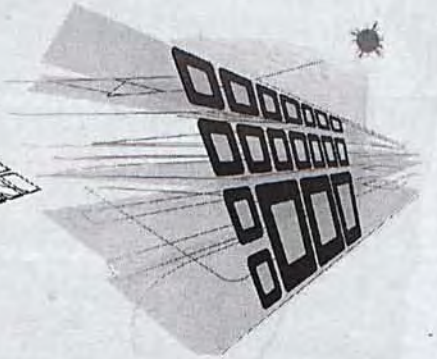
rainwater collection

delivery the rainwater from the tube structure to the constructed wetland via the floor slab and facade structure framework

## LAYER 2
## GREEN CELL
## FRAMEWORK

isometric view of greening cell





size of the vertical greening cell depending on the direct sunlight direction.

larger greening cell for the East and WEST direction

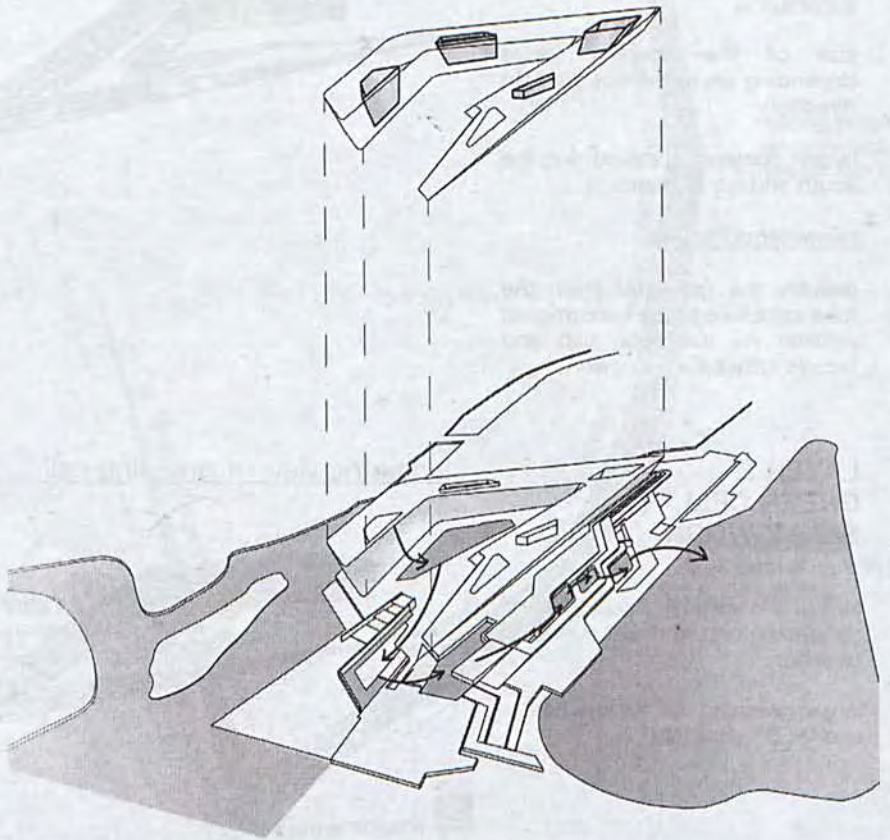
## MAGE TUBE STRUCTURE

**AS A VERTICAL STRUCTURAL MEMBER**
**AS A CONDUIT FOR RAINWATER COLLECTION**
**AS A PLANT NURSERY**
**AS A ATRIUM / LEISURE AREA**

The concept of mega tube structure is that via the structure members and extra grid structure under the floor slab, the collected rainwater would be guided to the floor slabs on lower level and then through the facade to the constructed wetland for the further water filtration or to the underground water storage tank.

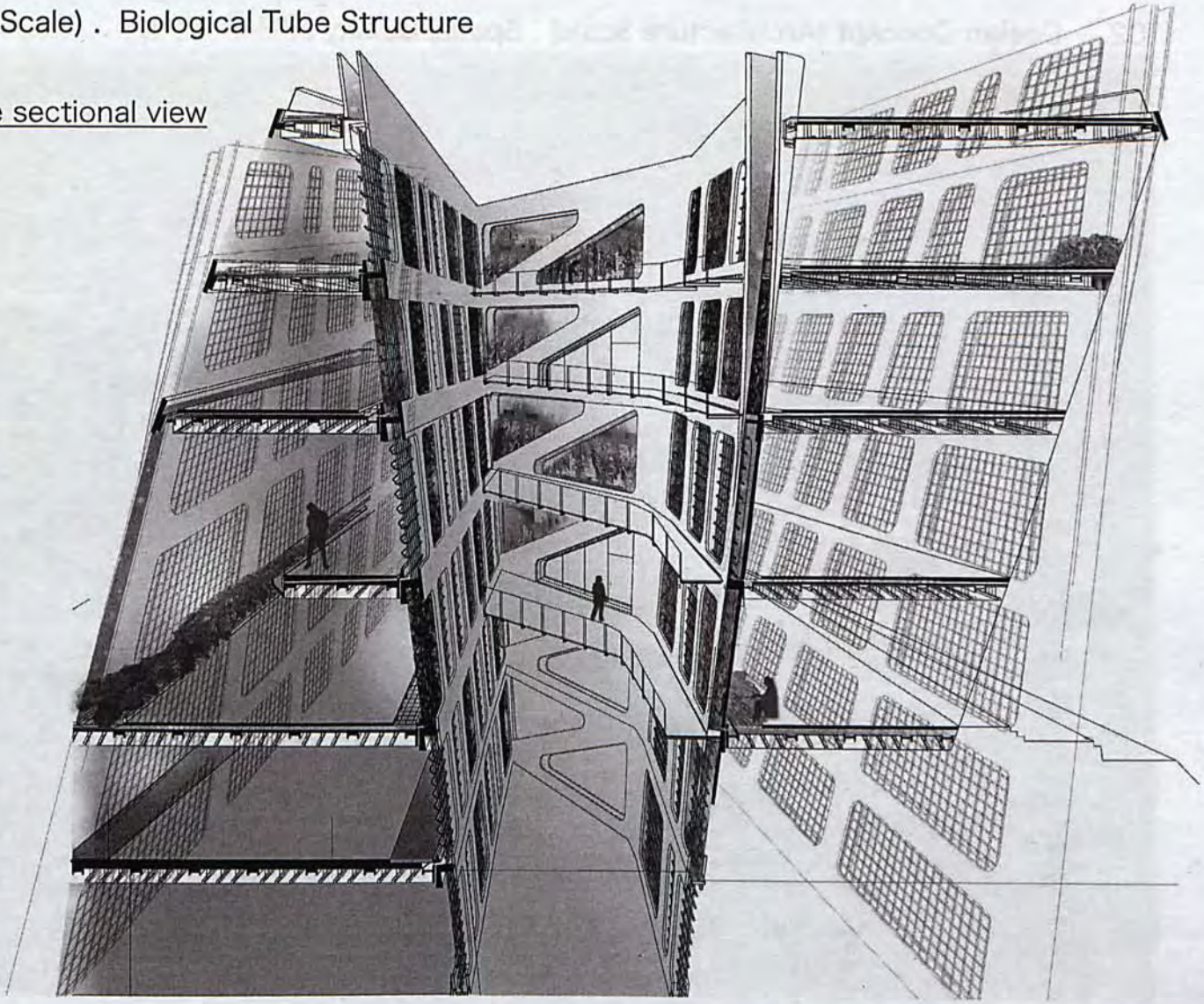
And the rainwater would become the water source of the vertical greening cell, which would be introduced as a sun shading device and enriching the spatial quality.

4 mega tube-form structures

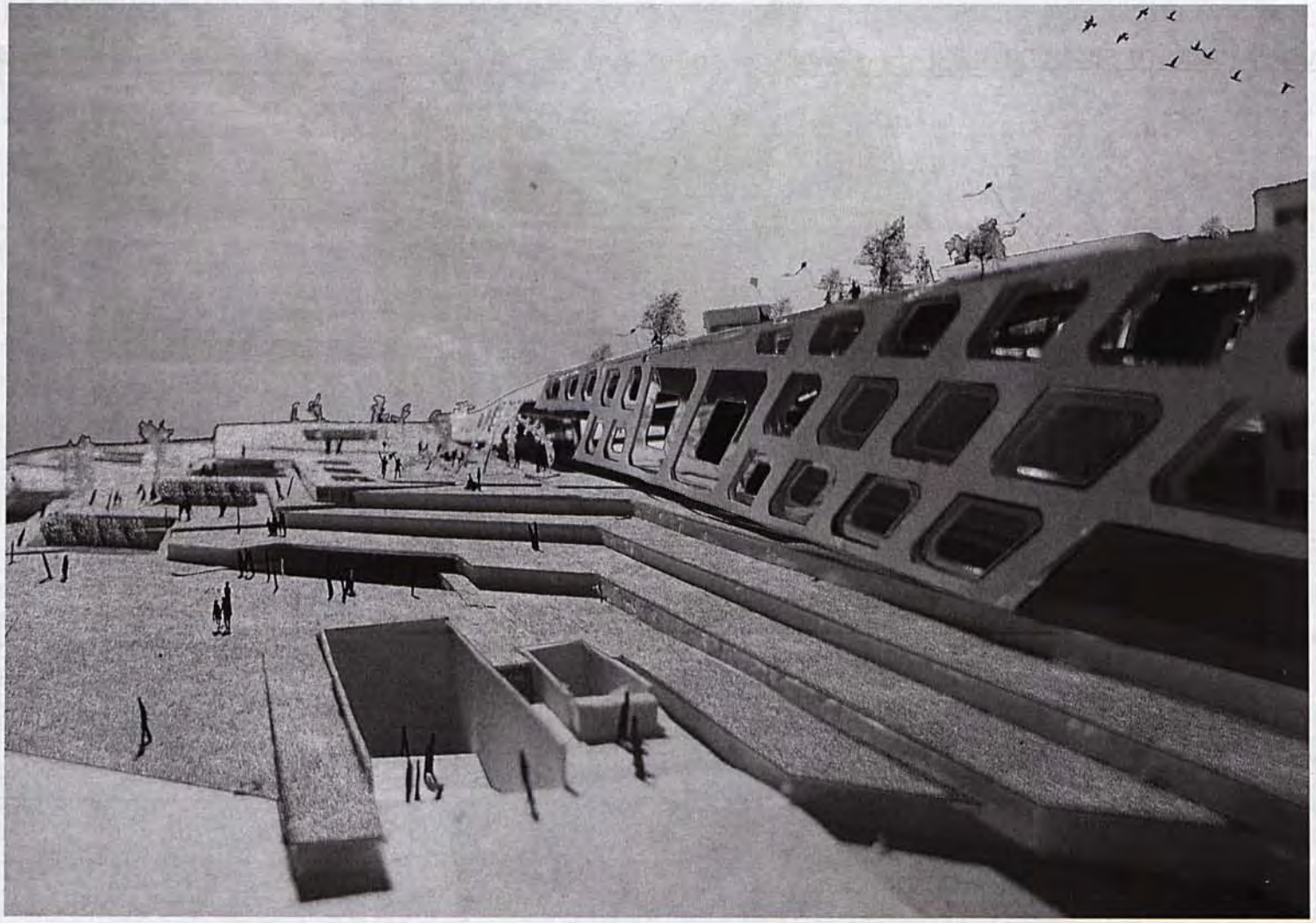


02 Design Concept (Architecture Scale) . Biological Tube Structure

Mega biological tube structure sectional view



## 02 Design Concept (Architecture Scale) . Spatial Quality



Left:

### Architecture + Landscape

using gentle sloping landscape and building form to create the harmony of the nature and architecture, but also facilitate the rainwater collection and the wetland cell mechanism

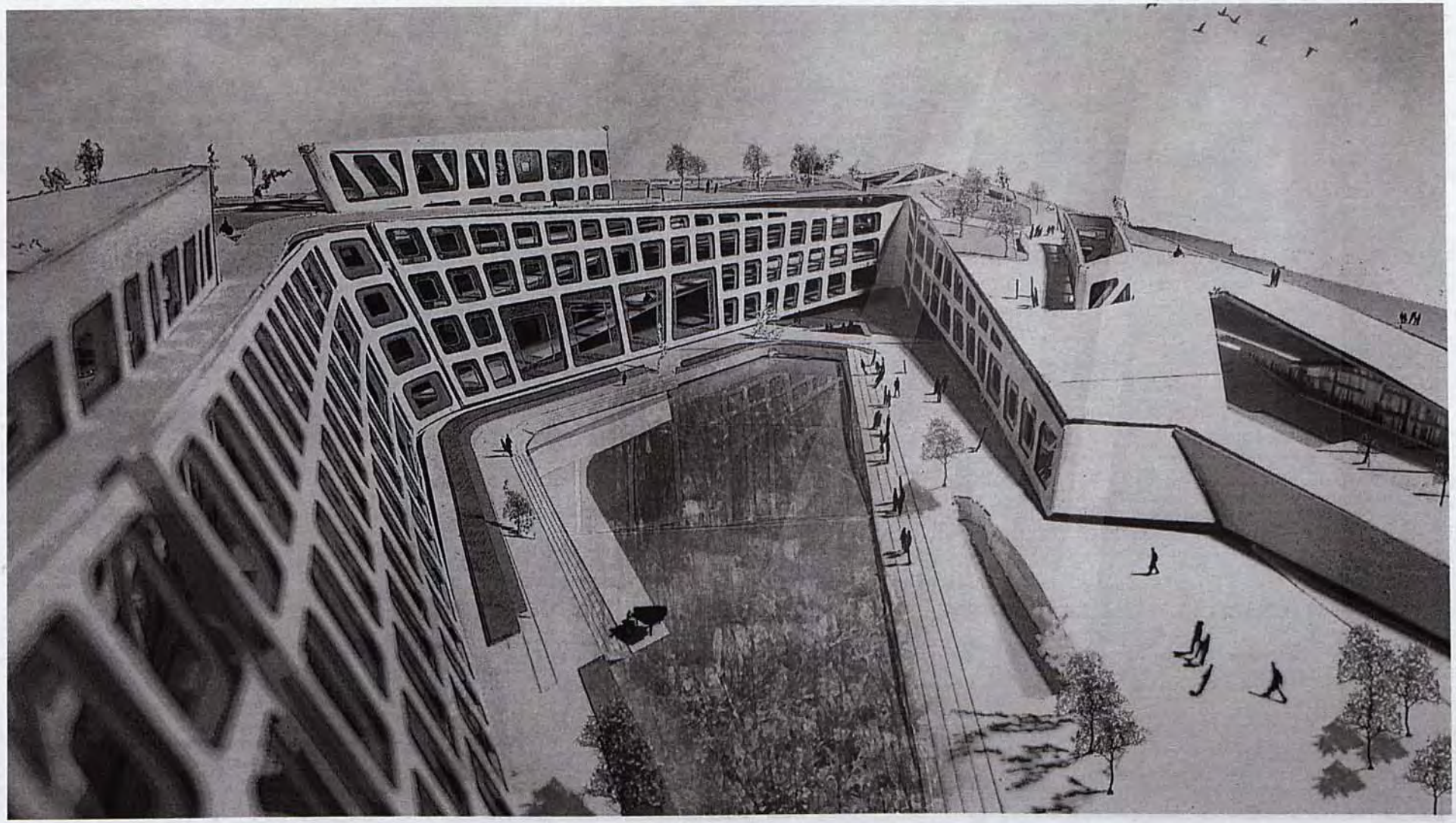
Right:

### Courtyard

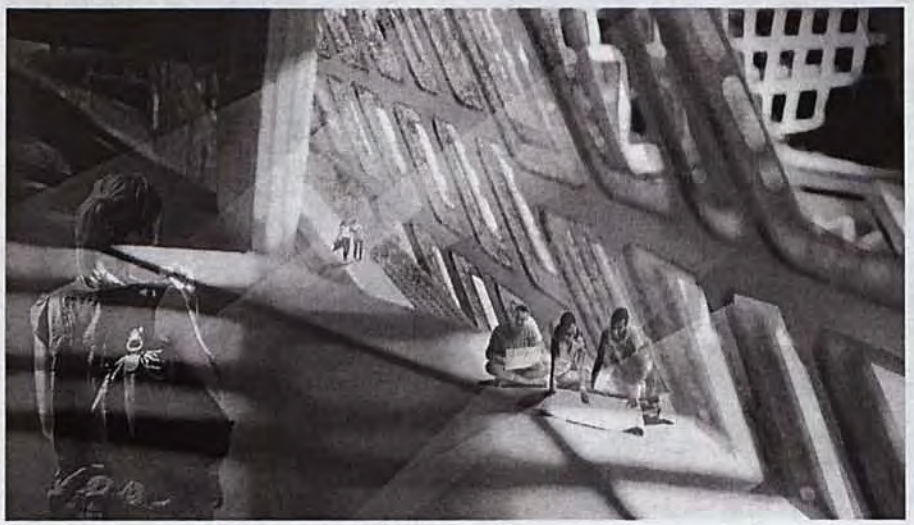
the zig-zag form of the building could provide a large courtyard space which is a water plaza co-operating with the constructed wetland cells.

the porous and greenery building skin (facade & roof) enhance the spatial connection between the interior and exterior space, and create a sense of natural basin for the courtyard space. The whole design acts as an interface for the human to experience the nature in the city.

02 Design Concept (Architecture Scale) . Spatial Quality



# 02 Design Concept (Architecture Scale) . Spatial Quality



Left: (top & bottom)

## Dramatic Space

The organic openings working with the vertical greenery module on the tube structure and the building facade cause the dramatic lighting.

Left: (right)

## Tube Structure as Vertical Garden

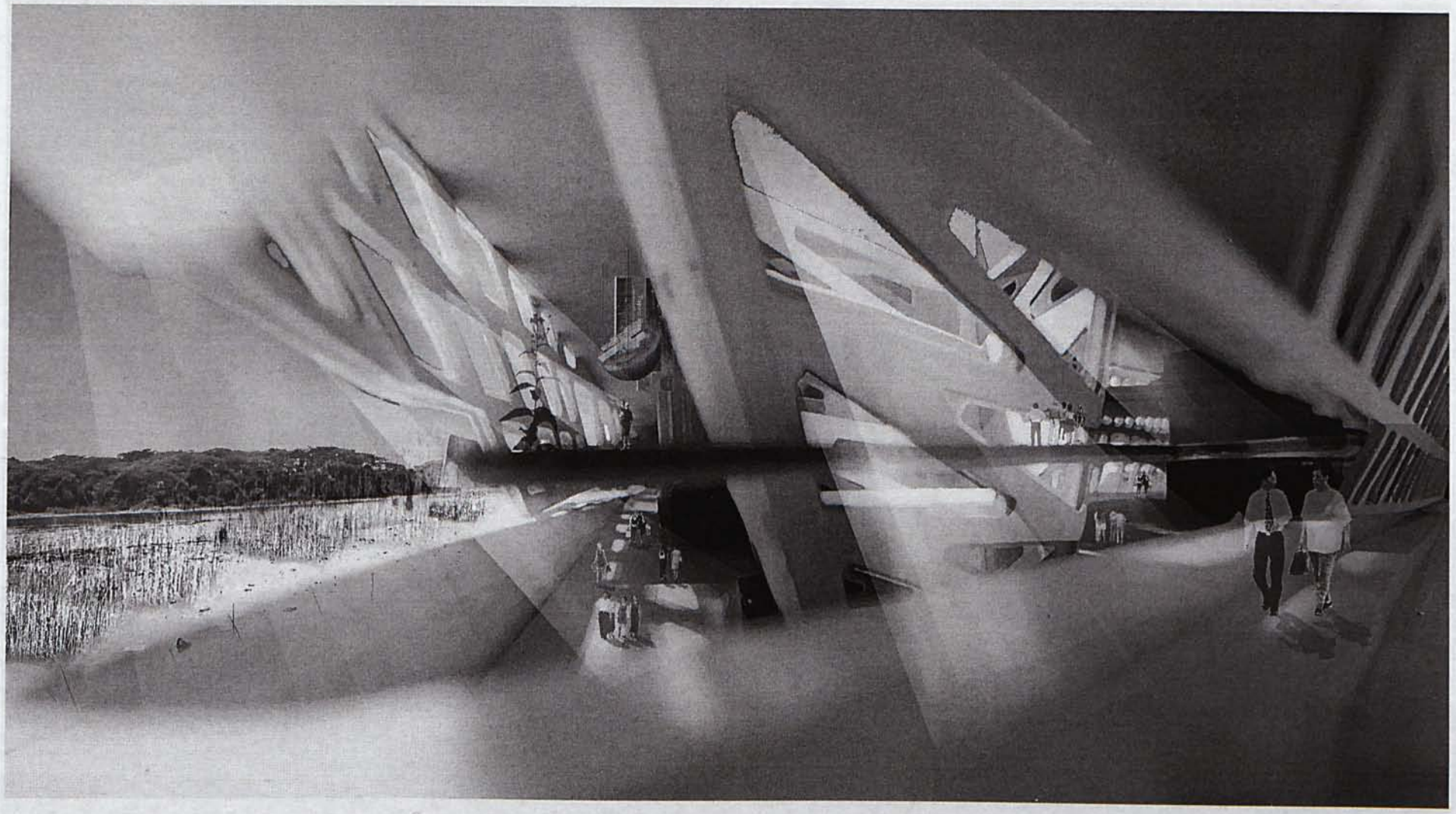
The interior space of the tube structure is formed as a private garden and the plant nursery factory for the adjacent research laboratory use.

Right:

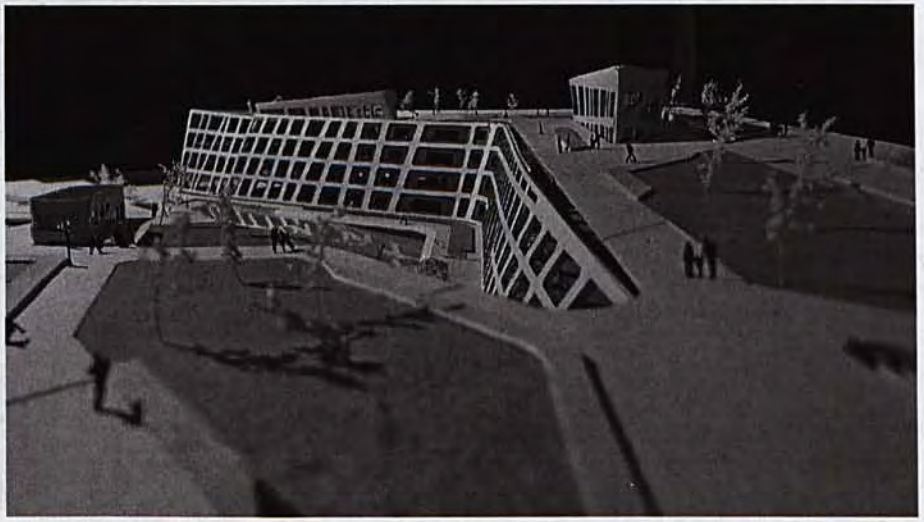
## Hybrid of Infrastructures

The Eco-Cultural hub become a new public domain in the city as it provides large sustainable open space and comprises the Kai Tak MTR station, Lung Tsun Stone bridge conservation project, the ecology museum, the ecology education centre, resaerch labortary and constructure wetland for sewage treatment.

02 Design Concept (Architecture Scale) . Spatial Quality

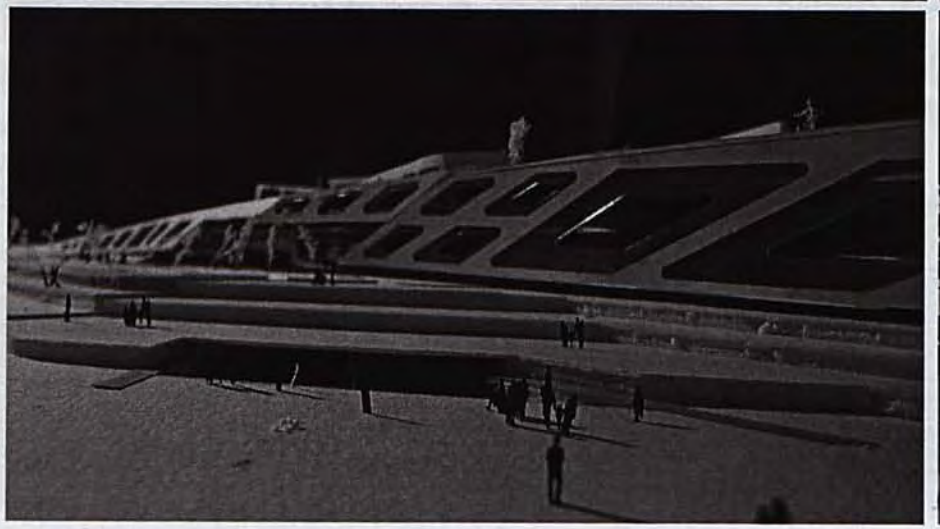


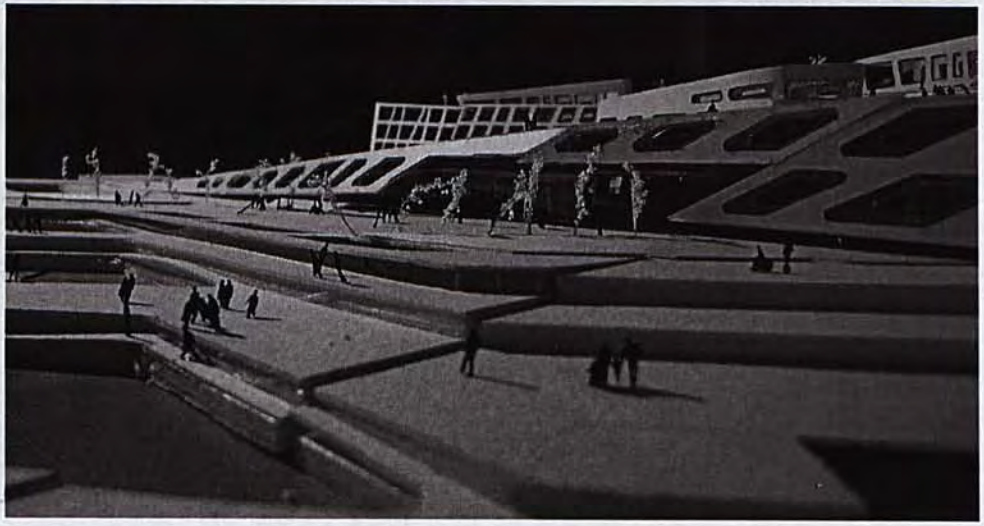
02 Design Concept (Architecture Scale) . Model Photo



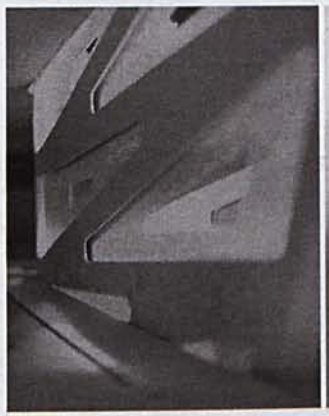
02 Design Concept (Architecture Scale) . Model Photo

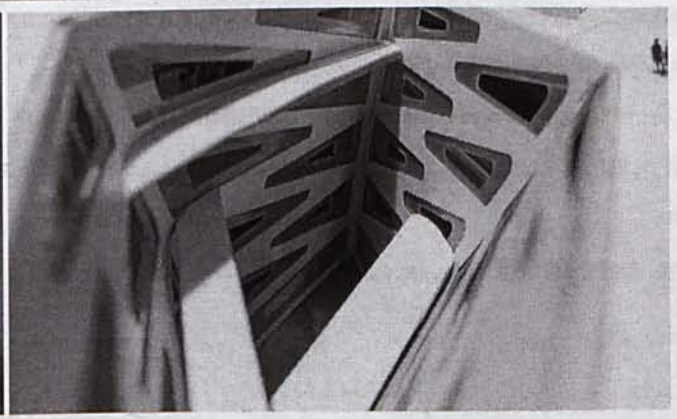
02 Design Concept (Architecture Scale) . Model Photo





02 Design Concept (Architecture Scale) . Model Photo





# 03 Reference


**Books**

01 Historical Melaka : 600 years of living history / [text, Zari Mahmood]. / 2005

02 Malacca : voices from the street / Lim Huck Chin, Fernando Jorge. / 2006

03 Making places special : stories of real places made better by planning / by Gene Bunnell. /2002

04 The gentrification debates / edited by Japonica Brown-Saracino. / 2010

05 Urban design : method and techniques / Cliff Moughtin ... [et al.] / 2003

06 ACAU review 2009, Re-engaging the urban canal / Department of Architecture, Univeristy of Seoul / 2009

07 Malacca, A Workd Heritage Site / Bonnny Wee / 2009

08 Waterscapes / Herbert Dreiseitl, Dieter Grau, Karl H.C. Ludwig / 2001

09 特大型城市線地系統佈局結構及其建築研究 / 張良 / 2008

10 滨水景观设计 / 日本土木学会编 ; 孙逸增译.

11 行為觀察與公園設計 / 拉特利奇著 ; 李素馨譯.

12 實地考察馬六甲 / 夏其龍編. / 2008

13 上海历史上的苏州河 = A history of Suzhou Creek, Shanghai / 郑祖安编著. / 2006

14 蘇州河文化遺產圖志(普陀段) = The cultural heritage of Soochow Creek in Putuo, Shanghai / 上海市普陀区文化局编. ／ 2009

15 东方的塞纳左岸 : 苏州河沿岸的艺术仓库 / 韩妤齐, 张松著 = Left bank of the Seine of the east : the art warehouses of Suzhou creek / authors, Han Yuqi and Zhang Song./ 2004

16 苏州河, 1978-2008 = Suzhou River / 徐喜先 / 2009

17 1% 的可能 : 韓國首爾 : 李明博的夢想奇蹟 / 作者: 李明博 ; 譯者: 薛舟,徐麗紅 / 2006v

# 03 Reference


**Webpage**

01 The official homepage of Suzhou creek rehabilitation and restoration
http://www.sscrpho.org/

01 The official portal of The Melaka State Government
http://www.melaka.gov.my/v3/index.php?poll_id=38

02 The official homepage of Cheonggyecheon
http://english.sisul.or.kr/grobal/cheonggye/eng/WebContent/index.html

**Papers**

01 Verandahways as catalysts for walking in a tropical city / Wan Azhar Sulaiman & Syed Sobri Zubir / 2004

02 Urban waterway and city fabric : harmony between urban and nature / So Chun Wai. / 2008

03 Cheonggyecheon Restoration in Seoul (The Beginning and After) / Soon Hong Noh / 2006

04 Constructed Wetlands for Sanitary and Industrial Wastewater Treatment in Developing Communities / Mark R. Paquiz / 2004

**Video**

01 Suzhou He [videorecording] = Su zhou he /
Strand Releasing presents an Essential Film and Dream Factory production ; director, screenplay Lou Ye / 2001